Indian Journal of Physiotherapy and Occupational Therapy

Editor-in-Chief
Archna Sharma

Ex-Head Dept. of Physiotherapy, G. M. Modi Hospital, Saket, New Delhi - 110 017
Email : editor.ijpot@gmail.com

Sub-Editor
Kavita Behal
MPT (Ortho)

INTERNATIONAL EDITORIAL ADVISORY BOARD

1. Vikram Mohan (Lecturer) Universiti Teknologi MARA, Malaysia
2. Angusamy Ramadurai (Principal) Nyangabgwe Referral Hospital, Botswana
3. Faizan Zaffar Kashoo (Lecturer) College Applied Medical Sciences, Al-Majma'ah University, Kingdom of Saudi Arabia
4. Amr Almaz Abdel-aziem (Assistant Professor) of Biomechanics, Faculty of Physical Therapy, Cairo University, Egypt
5. Abhilash Babu Surabh (Physiotherapist) Long Sault, Ontario, Canada
6. Avanianban Chakkarapani (Senior Lecturer) Quest International University Perak, IPOH, Malaysia
7. Manobhiram Nellutla (Safety Advisor) Fiosa-Miosa Safety Alliance of BC, Chilliwack, British Columbia
8. Jaya Shanker Tedla (Assistant Professor) College of Applied Medical Sciences, Saudi Arabia
9. Stanley John Winser (PhD Candidate) at University of Otago, New Zealand
10. Salwa El-Sobkey (Associate Professor) King Saud University, Saudi Arabia
11. Saleh Aloraibi (Associate Professor) College of Applied Medical Sciences, Saudi Arabia
12. Rashij M, Faculty-PT Neuro Sciences College of Allied Health Sciences, UAE
14. Muhammad Naveed Babur (Principal & Associate Professor) Isra University, Islamabad, Pakistan
15. Zbigniew Sliwinski (Professor) Jan Kochanowski University in Kielce
16. Mohammed Taher Ahmed Omar (Assistant Professor) Cairo University, Giza, Egypt
17. Ganesan Katiresan (DBC Senior Physiotherapist) Kuching, Sarawak, Malaysia
18. Kartik Shah (Health Consultant) for the Yoga Expo, Canada
19. Shweta Gore (Senior Physical Therapist) Narayan Rehabilitation, Bad Axe, Michigan, USA
20. Ashokan Arumugam MPT (Ortho & Manual Therapy), PhD, Department of Physical Therapy, College of Applied Medical Sciences, Majmaah University, Kingdom of Saudi Arabia
21. Veena Raigangar (Lecturer) Dept. of Physiotherapy University of Shahjahanabad U.A.E
22. Dave Bhargav (Senior Physical Therapist) Houston, Texas
23. Dr. Jagatheesan A Assistant Professor, Gulf Medical University, Ajman, UAE.

NATIONAL EDITORIAL ADVISORY BOARD

1. Charu Garg (Incharge PT), Sikanderpur Hospital (MJSMSRS), Sirsa Haryana, India
2. Vaibhav Madhukar Kapre (Associate Professor) MGM Institute of Physiotherapy, Aurangabad (Maharashtra)
3. Amit Vinayak Nagrale (Associate Professor) Maharashtra Institute of Physiotherapy, Latur, Maharashtra
4. Manu Goyal (Principal), M.M University Mullana, Ambala, Haryana, India
5. P. Shanmuga Raju (Asst.Professor & I/C Head) Chalmeda AnandRao Institute of Medical Sciences, Karimnagar, Andhra Pradesh
6. Sudhanshu Pandey (Consultant Physical Therapy and Rehabilitation) Department / Base Hospital, Delhi
7. Aparna Sarkar (Associate Professor) AIP, Amity university, Noida
8. Jasobanta Sethi (Professor & Head) Lovely Professional University, Phagwara, Punjab
9. Patitapaban Mohanty (Assoc. Professor & H.O.D) SVNIRTAR, Cuttack, Odisha
10. Suraj Kumar (HOD and Lecturer) Physiotherapy Rural Institute of Medical Sciences & Research, Paramedical Vigyan Mahavidhyalaya Sialoi, Etawah,UP
11. U.Ganapathy Sankar (Vice Principal) SRM College of Occupational Therapy, Kattankulathur, Tamil Nadu
12. Hemant Juneja (Head of Department & Associate Professor) Amar Jyoti Institute of Physiotherapy, Delhi
13. Sanjiv Kumar (I/C Principal & Professor) KLEU Institute of Physiotherapy, Belgum, Karnataka
14. Shaji John Kachanathu (Associate Professor) Jaipur Physiotherapy College, Rajasthan, India
15. Narasimman Swaminathan (Professor, Course Coordinator and Head) Father Muller Medical College, Mangalore
16. Pooja Sharma (Assistant Professor) AIP, Amity University, Noida
17. Nilima Bedekar (Professor, HOD) Musculoskeletal Sciences, Sancheti Institute College of Physiotherapy, Pune.
18. N.Venkatesh (Principal and Professor) Sri Ramachandra University, Chennai
19. Meenakshi Batra (Senior Occupational Therapist), Pandit Deen Dayal Upadhyaya Institute for The Physically Handicapped, New Delhi
20. Shovan Saha, T (Associate Professor & Head) Occupational Therapy School of Allied Health Sciences, Manipal University, Manipal, Karnataka
21. Akshat Pandey, Sports Physiotherapist, Indian Weightlifting Federation / Senior Men and Woman / SAI NSNIS Patiala
INDIAN JOURNAL OF PHYSIOTHERAPY AND OCCUPATIONAL THERAPY

NATIONAL EDITORIAL ADVISORY BOARD

23. Maneesh Arora, Professor and as Head of Dept, Sardar Bhagwan (P.G.) Institute of Biomedical Sciences, Balalawa, Dehradun, UK
24. Deepak Sharar, Medical Director and Sole Proprietor, RECOUP Neuromusculoskeletal Rehabilitation Centre, New Delhi
25. Jayaparakash Jayavelu, Chief Physiotherapist – Medanta The Medicity, Gurgaon Haryana
26. Vaibhav Agarwal, Incharge, Dept of physiotherapy, HIHT, Dehradun,
27. Shipra Bhatia, Assistant Professor, AIPPT, Amity university, Noida
28. Jaskirat Kaur, Assistant Professor, Indian Spinal Injuries Center, New Delhi
29. Prashant Mukkanavar, Assistant Professor, S.D.M College of Physiotherapy, Dharwad, Karnataka
30. Chandan Kumar, Associate Professor & HOD, Neuro-physiotherapy, Mahatma Gandhi Mission’s Institute of Physiotherapy, Aurangabad, Maharashtra
31. Satish Sharma, Assistant Professor, I.T.S. Paramedical College Murad Nagar Ghaziabad
32. Richa, Assistant Professor, I.T.S. Paramedical College Murad Nagar Ghaziabad
33. Manisha Uttam, Research Scholar, Punjabi University, Patiala
34. Dr. Ashfaq Khan (PT), HOD Physiotherapy, Integral University Lucknow U.P.
35. Dr. Dibyendunarayan Bid (PT) Senior Lecturer The Sarvajaniak College of Physiotherapy Rampura, Surat
36. Vijayan Gopalakrishna Kurup, Senior Physiotherapist, Rajagiri Healthcare & Education Trust, Aluva, Kerala

SCIENTIFIC COMMITTEE

1. Gaurav Shori (Assistant Professor) I.T.S College of Physiotherapy
2. Baskaran Chandrasekaran (Senior Physiotherapist) PSG Hospitals, Coimbatore
3. Dharam Pandey (Sr. Consultant & Head of Department) BLK Super Speciality Hospital, New Delhi
4. Jeba Chitra (Associate Professor) KLEU Institute of Physiotherapy Belgaum, Karnataka
5. Deepak B.Anap (Associate Professor) PDVPPF’s, College of Physiotherapy, Ahmednagar. (Maharashtra)
6. Shalini Grover (Assistant Professor) HOD-FAS, MRIU
7. Vijay Batra (Lecturer) ISIC Institute of Rehab. Sciences
8. Ravinder Narwal (Lecturer) Himalayan Hospital, HIHIT Medical University, Dehradun-UK.
9. Abraham Samuel Babu (Assistant Professor) Manipal College of Allied Health Sciences, Manipal
10. Anu Bansal (Assistant Professor and Clinical Coordinator) AIPPT, Amity University, Noida
11. Bindya Sharma (Assistant Professor) Dr. D. Y. Patil College of Physiotherapy, Pune
12. Dheeraj Lamba, Associate Professor & Research Coordinator, School of Physiotherapy, Lovely Professional University, Phagwara (India)
13. Soumya G (Assistant Professor) (MSRMC)
14. Nalina Gupta Singh (Assistant Professor) Physiotherapy, Amr Jyoti Institute of Physiotherapy, University of Delhi
15. Gayatri Jadav Upadhyay (Academic Head) Academic Physiotherapist & Consultant PT, RECOUP Neuromusculoskeletal Rehabilitation Centre, Bangalore
16. Nusrat Hamdani (Asst. Professor and Consultant) Neurophysiotherapy (Rehabilitation Center, Jamia Hamdard) New Delhi
17. Ramesh Debur Visweswara (Assistant Professor) M.S. Ramaiah Medical College & Hospital, Bangalore
18. Nishat Quddus (Assistant Professor) Jamia Hamdard, New Delhi
19. Anand Kumar Singh, Assistant Professor, RP Indraprast Institute of Medical Sciences Karnal, Haryana
20. Pardeep Pahwa, Lecturer, Composite Regional Rehabilitation Centre, Sunder-Nagar under NIVH (Ministry of Social Justice & Empowerment, New Delhi)

"Indian Journal of Physiotherapy and Occupational Therapy" An essential indexed peer reviewed journal for all physiotherapists & occupational therapists provides professionals with a forum to discuss today’s challenges- identifying the philosophical and conceptual foundations of the practice; sharing innovative evaluation and treatment techniques; learning about and assimilating new methodologies developing in related professions; and communicating information about new practice settings. The journal serves as a valuable tool for helping therapists deal effectively with the challenges of the field. It emphasizes articles and reports that are directly relevant to practice. The journal is now covered by INDEX COPERNICUS, POLAND and covered by many internet databases. The Journal is registered with Registrar of Newspapers for India vide registration number DELENG/2007/20986

Print- ISSN: 0973-5666, Electronic - ISSN: 0973-5674, Frequency: Quarterly (4 issues per volume).
Website: www.ijpot.com

© All Rights reserved The views and opinions expressed are of the authors and not of the Indian Journal of Physiotherapy and Occupational Therapy. The Indian Journal of Physiotherapy and Occupational Therapy does not guarantee directly or indirectly the quality or efficacy of any products or service featured in the advertisement in the journal, which are purely commercial.
<table>
<thead>
<tr>
<th>No.</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Effects of Core Stabilization Exercises and Core Stabilization Exercises with Kinesiotaping for Low Back Pain and Core Strength in Bharatanatyam Dancers</td>
<td>Manjiri Kulkarni, Ronika Agrawal, Fazila Shaikh</td>
</tr>
<tr>
<td>2.</td>
<td>Effect of a 6-Week Agility Training Program on Spatiotemporal Parameters in Gait Cycle of Indian Taekwondo Players</td>
<td>Amrinder Singh, Abhinav Sathe, Jaspal Singh Sandhu</td>
</tr>
<tr>
<td>3.</td>
<td>A Study to Ascertain Normative Value for Two-Point Discrimination Ability for the Lower Limb among Healthy Indian Middle-Aged Population: A Pilot Study</td>
<td>Lekshmi Vijayan, Smitha D</td>
</tr>
<tr>
<td>4.</td>
<td>Effects of Modified Sit to Stand Training with Mental Practice on Balance and Gait in Post Stroke Patients</td>
<td>Suchetha P S, Supriya B, Kovela Rakesh Krishna</td>
</tr>
<tr>
<td>5.</td>
<td>Factors affecting Recovery after Stroke: A Narrative Review</td>
<td>Ashish Kakkad, Priyanshu V Rathod</td>
</tr>
<tr>
<td>7.</td>
<td>Comparison of Knee Rotations in Asymptomatic &amp; Osteoarthrosis Patients</td>
<td>Pallavi D Chopade, Payal Jain-Patni, Vasudha Gholap</td>
</tr>
<tr>
<td>9.</td>
<td>Effect of Muscle Energy Technique and Active Release Technique on Hip Internal and External Rotation Range of Motion and Strength in Competitive Football Players: A Randomized Clinical Trial</td>
<td>Anil Muragod, Prajakta Pattil, Shikha Ashish Raval, Prateek Hiremath</td>
</tr>
<tr>
<td>10.</td>
<td>To Compare the Effectiveness of Active Release Technique and Conventional Physical Therapy in the Management of Upper Cross Syndrome</td>
<td>Sneha Joshi, Namrata Srivastava</td>
</tr>
<tr>
<td>11.</td>
<td>Comparison of Effectiveness of Upper Quarter Neurodynamic Treatment and Cervical Traction in Cervical Radiculopathy- A Pilot Study</td>
<td>Abhilash P.V, Mayur Rai, Princy M Narayanan, Priya S</td>
</tr>
</tbody>
</table>
   Srishti Choudhary, Rashida Begum

13. Meta-Analysis on Physiotherapy Modalities Used in Patients of Total Knee Replacement for Pain Relief ........................................................................................................... 67
   Neha J Mishra, Suvarna Ganvir

   Padmanabhan Suresh Babu Roshan, Chandrashekar G S, Rakesh K R, Haripriya S

15. Differences in Speed, Agility and Vertical Jump among Athletes of Various Sports ..............79
   Oves Patni, Viraj Dhaduk, Fenil Jariwala, Parinda Patel, Hiral Hadiya

16. Comparison between Effectiveness of Active Release Technique and Capsular Stretch along with Conventional Therapy in the Management of Frozen Shoulder ........................................... 85
   Saurav Singh Kushwah, Namrata Srivastava

17. Parental Stress and Compliance with Home Exercise Program of Children with Developmental Delay – A Correlation ......................................................................................... 91
   Jyoti Jeevannavar, Akshata Madinkar, Santosh Jeevannavar

18. Effects of Scapular Taping on Pain and Disability in Mechanical Neck Pain-An Experimental Study ..... 95
   Suchetha P S, Darwin Abraham, Saumya Srivastava

19. A Study to Analyze the Efficacy of Strength Training Exercise for Fall Related Gait Kinematics in Elderly – An Experimental Study ............................................................. 101
   Rajendra Kachhwaha, Sriraghunath S, Arunkumar, David Arunkumar, Ishita Vyas

20. Rehabilitation Interventions and Outcomes for a Person with Rotationplasty ........................... 107
   M S Satish, S Vijay, Anand Raja, Anitha D

21. Study to Findout the Efficacy of Osteopathic Manual Therapy in Chest Expansion in COPD Patients .. 113
   Harish S Krishna, D’sa Peter Ivor, Riyas Basheer K B, Sharma Vishnu

22. Effectiveness of Occupational Therapy Interventions on Depression and Quality of Life of Mothers with Autistic Children ................................................................. 120
   Sadia Khanum, Rashida Begum

23. Comparison between Handgrip Strength Measurement of Dominant Hand and Non Dominant Hand in Basketball Players ................................................................. 126
   Priya S, Mayur Rai, Dinu K Joseph

24. Occurrence of Flat Foot in Grade-I Obese Teachers – A Cross Sectional Study .......................... 131
   Niyati N Mistry, Suchit S Shetty

25. Comparison between Non-VAP and VAP Patients with Acquired Brain Injury those were Admitted in Intensive Care Unit ................................................................. 136
   Sachin Aggarwal, S K Luhadia, Pallav Bhatnagar, Mundendra Goyal
26. Effectiveness of Prophylactic Respiratory Physiotherapy in Reducing the Mechanical Ventilation Stay of Patients with Acquired Brain Injury in Intensive Care Unit ................................................................. 140
   Sachin Aggarwal, S. K Luhadia, Pallav Bhatnagar, Mundendra Goyal

27. Find Out the Age Specific Items of Short Sensory Profile Filled up by the Caregivers of Indian Children with and without Autism Spectrum Disorder ........................................................................ 144
   Hetal Jagdishkumar Tripathi, Ranjeet Pathak, Amitabh Dwivedi, Titiksh Vijeshkumar Varma, Krupa Babulal Prabhakar

28. Analyse the Reported Time Duration of SSP Filled up by the Caregivers of Children with and without ASD among Indian Population ........................................................................................................ 151
   Hetal Jagdishkumar Tripathi, Titiksh Vijeshkumar Varma, Krupa Babulal Prabhakar, Ranjeet Pathak, Amitabh Dwivedi

29. Common Repetitive Stress Injury among Housewives, Karachi Pakistan ................................................ 156
   Sadaf Subhi, Iram Iqbal Shamsi, Umesh Kumar, Reeta

30. Effectiveness of Cumin (Nigella Sativa) Extract on the Decrease of IL-6 Serum Level and P65 Placental NF-KB Expression in Preeclampsia Mice ........................................................................ 161
   Hamimatus Zainiyah, Rubiati Hipnini Wayan Novian, I Wayan Agung Indrawan

31. To Study the Effectiveness of Occupational Therapy in Children with Overweight/Obesity and its Impact Upon Quality of Life ................................................................................................. 166
   Ritika Gogia, Rashida Begum

32. Intra-Rater and Inter-Rater Reliability of Foot Print Analysis Tool ................................................................. 171
   Jyoti S Jeevannavar, Sampada Kulkarni, Bhavana Ankolekar, Kiran P Nadgauda, Kirtana Shilesh, Reshma H. Bachgoudar

33. Utilization and Demonstration of Oral Motor Tools ...................................................................................... 176
   Kaaynat Khan, Shubha Arora, Shama Tabassum, Dimple Sharma, Sana Hasan

34. Early Detection of Potential Scoliosis in Elementary School Student of Banjarmasin: Result of Three Examination Models ........................................................................................................ 181
   Farida Heriyani, Hendra Haika Prayudha, Galih Adji Pratama, Muhammad Fahrizal Kairullah, Zairin Noor
Effects of Core Stabilization Exercises and Core Stabilization Exercises with Kinesiotaping for Low Back Pain and Core Strength in Bharatanatyam Dancers

Manjiri Kulkarni¹, Ronika Agrawal², Fazila Shaikh³
¹Assistant Professor, ²Professor & Principal, ³Intern, M. A. Rangoonwala College of Physiotherapy & Research, Pune

ABSTRACT

Aim: To study the effects of core stabilization exercises versus core stabilization with kinesiotaping for low back pain and core strength in Bharatanatyam dancers.

Objective: To compare the effect of core stabilization exercises versus core stabilization exercises with kinesiotaping for low back pain on VAS and core strength in Bharatanatyam dancers.

Method: Sixty subjects had participated in the study, randomly divided into two equal groups. All subjects were asked to fill the consent form, demographic details, questionnaire which included year of dance experience, practicing hours per day/week. Assessment record was maintained of VAS scale to rate their pain intensity and core strength were given detailed explanation for the same and had asked to rate their pain on VAS.

Result: - This study found out that Core stabilization exercise along with Core stabilization exercise with Kinesiotaping had equal effects for low back pain in Bharatanatyam dancers is an effective rehabilitation technique, irrespective of duration of their pain. Present study showed reduction in VAS and improvement in core strength over a period of 6 weeks in both the groups.

Conclusion: The study concluded that statically both the groups had equal effects on reduction of low back pain and improvement of core strength in bharatnatyam dancers.

Keywords: Core Stabilization, Kinesiotaping, Visual analogue scale (VAS), Core strength.

INTRODUCTION

Dance is the expression of the soul, it is nonverbal means of communication which involves the movement of the body which in turn moves the entire system. Dependency of dance is a social, cultural, aesthetic, artistic and moral constraints of a society. Dance has developed as a classical art, media between the external world and internal [1]. There are various transitions in dancing styles, where complex movements are introduced, which can overload the weak zones, which very easy to get injured. Hence, evaluation of structural changes in human body, which is happening over a period of time, may help in preventing further injuries [2]. Studies on dance and its association with injuries report a high frequency of musculoskeletal lesions. Motta-Valencia and Bronner et al report that as many as 95% of dancers are affected by injury in studies of nature [3]. A systematic review of musculoskeletal injury in ballet, modern, and theatrical dancer found that most reported injuries are mild or minor, are chronic or overuse in nature, and affect the back and lower extremities. Exploring Bharatanatyam provides the opportunity to investigate the potential causes of injury among Indian
classical dancers, a less studied population of dancers have been done \[^4\]. Motor control has not been examined in dancers, despite the high prevalence of LBP in this young population. Several authors suggested the need for a clinical assessment of active movement control in LBP-patients (Maluf et al., 2000; O’Sullivan, 2005; Luomajoki et al., 2007) \[^5\]. Due to lack of research work done specifically on Indian classical dancers and in their own context and it acts as a great impediment in providing a scientific recommendation to prevent injuries and offer the right treatment. There is a need of depth study and analysis of the Indian classical dancers with coordination to their training and practice patterns is the main reason for this scenario \[^6\].

One of the forms of many Indian classical dance is Bharatanatyam which has its origin in Tamil Nadu, a region of southern India (Pillai 2002). This dance was historically named sadir and used to performed in the nineteenth century by devadasis (who danced for the statues of deities in the Hindu temples. Bharatanatyam tells the religious stories, and the technique of the steps and postures represents the Hindu deities which is based on a half-squatting position (aramandi) or a full-squatting position (muzumandi) along with rhythmic movement of the feet and a multitude of crisp and meaningful hand gestures. In order to correctly execute aramandi, the dancer has to sit as deeply as she can while still keeping her back straight, feet together in a V-formation, heels on the floor, legs rotated outwards, and knees spread apart. The same posture is maintained, but the heels come off the floor as the dancer fully squats in muzumandi \[^3\].

Due to practice of a faulty posture for a long duration in one’s dancing career could also result in a permanent structural change. Wrong adaptation of this posture will put an excessive stress on the spine, especially the lumbar spine, and result in pain, disability among the dancers. Evidences that show increased lumbar lordosis and pelvic inclination can lead to low back pain \[^6\]. Hence dancers are at increased risk for developing musculoskeletal complaints of the spine and lower extremities \[^2\].

**METHODOLOGY & MATERIALS**

**Study Design:** Experimental study.

**Study Population:** Bharatanatyam dancers.

**Study Setting:** Four Bharatanatyam Dance Institutes.

**Sample Size:** Sixty subjects

**Sampling Design:** Convenient Sampling

**INCLUSION CRITERIA**

Indian classical dancers, Bharatanatyam dancers

Minimum one year of regular dance practice.

Minimum dance should perform thrice a week.

Age between 18 - 30 years.

VAS rating 4 or less than 4 out of 10

**EXCLUSION CRITERIA**

Pain due to any musculoskeletal dysfunction in last two years.

Subjects with neurological deficits

Irregular participation of subjects during training sessions.

Subjects with musculoskeletal deformity involving spine and lower limb.

Hypersensitivity to kinesiotape.

**STUDY PROCEDURE**

A convenient sample of 60 subjects between the age of 18 to 30 years included for this study after screening the subjects according to the inclusion and exclusion criteria. The subjects then divided equally into 2 groups by chit method:

1. Group A received core stabilization exercises
2. Group B received core stabilization exercises with kinesio taping

30 subjects received core stabilization exercises 3 times a week for 6 weeks with supervisions.

The core stabilization exercises included activation of core muscle group using drawing in maneuver along with progression by addition of movements of lower limb.

30 subjects in second group received core stabilization exercises for 3 times a week for 6 weeks with supervisions and kinesio tape applied two times a
week. Y taping method was used using a Kinesiotape that was applied from sacrospinalis till the thoracic region.

Subjects were evaluated at the beginning of the therapy and re-evaluated every after 2 weeks followed by progression criteria of 6 weeks. This is done to note the changes after the treatment.

Visual Analogue Scale was used for pain rating from 0 ie. no pain to 10 ie. most severe pain imaginable.

**FINDINGS**

The aim of study was to find out the effect of Core Stabilization exercise and Core Stabilization with Kinesio taping for low back pain and core strength in Bharatanatyam dancers. It primarily aimed to assess the effect at 3rd weeks and 6th week on pain and disability and core strength. Subjects were randomly allocated to two groups; Group A received Core stabilization exercise and Group B received Core stabilization exercise with Kinesio taping.

Mean Age in Core Strength and in Core strength with kinesiotaping that the subjects in Core strength group was 20.8 years (±3.04) and in Core Strength group with kinesiotaping group was 22.6 years (±3.09). There was no statistical difference in mean age of Core and Core with kinesiotaping group, hence two groups were comparable.

Mean Dance Experience in Core strength and in Core strength with kinesiotaping that the subjects in Core strength group had 92.4 months (±56.2) and in Core strength with kinesiotaping group had 96.6 months (±40.95). There was no statistical difference in mean dance experience, hence this two groups were comparable.

**Table 1- Analysis of Mean difference in VAS 1st, 3rd and 6th week in Core Group**

<table>
<thead>
<tr>
<th>Group</th>
<th>Count</th>
<th>Mean</th>
<th>SD</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 1</td>
<td>30</td>
<td>2.67</td>
<td>0.8</td>
<td>5.88E25</td>
</tr>
<tr>
<td>Week 3</td>
<td>30</td>
<td>1.3</td>
<td>0.83</td>
<td></td>
</tr>
<tr>
<td>Week 6</td>
<td>30</td>
<td>0.03</td>
<td>0.17</td>
<td></td>
</tr>
</tbody>
</table>

Table 1- Shows the Analysis of VAS Mean difference in 1st,3rd and 6th week in Core group. ANOVA single factor using used for analysis,which shows a significant difference in the P value between VAS 1st,3rd and 6th week in Core group. This group showed a considerable decreased in VAS score, this could be due to development of pain in the lumbar spine region leads to disturbances in the mechanoreceptors and impairment of the superior proprioception centres. Therefore, exercise programs that enhance proprioception may be beneficial for managing low back pain [2]. There could be another reason that, core stabilization creates a “girdle” of protection for the low back that challenge balance, postural trunk muscles, flexibility and coordination. Exercise training of the “stability” muscles of the trunk may show effectiveness in reducing pain and functional disability in patients with symptomatic low back pain [7].

**Table 2- Analysis of mean difference in VAS 1st, 3rd and 6th week in Core with Kinesiotaping group**

<table>
<thead>
<tr>
<th>Group</th>
<th>Count</th>
<th>Mean</th>
<th>SD</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 1</td>
<td>30</td>
<td>2.87</td>
<td>0.22</td>
<td>7.44E-37</td>
</tr>
<tr>
<td>Week 3</td>
<td>30</td>
<td>0.43</td>
<td>0.56</td>
<td></td>
</tr>
<tr>
<td>Week 6</td>
<td>30</td>
<td>0.00</td>
<td>0.00</td>
<td></td>
</tr>
</tbody>
</table>

Table 2- Shows the Analysis of VAS Mean difference in 1st,3rd and 6th week in Core with Kinesiotaping group. ANOVA single factor using used for analysis,which shows a significant difference in the P value between VAS 1st,3rd and 6th week in core with Kinesiotaping group. This group showed considerable decrease in VAS score as compared to the core group, this could be because of the spinal stabilization exercises are more effective in improving functional status and lessen the behavioural, cognitive and disability aspects of low back pain syndrome. In addition to that the traction created by kinesiotape elevates the epidermis increasing the pressure on the mechanoreceptors below the dermis, thus decreases nociceptive stimuli, and also Kinesio Taping has stated that the tape is able to improve blood and lymphatic circulation, which reduces pain, and reduces muscle tension [9].
Table 3- Analysis of Mean Differences in Core Strength 1st, 3rd and 6th Week in Core Group.

<table>
<thead>
<tr>
<th>Group</th>
<th>Count</th>
<th>Mean</th>
<th>SD</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 1</td>
<td>30</td>
<td>41.27</td>
<td>0.94</td>
<td>2.38E-22</td>
</tr>
<tr>
<td>Week 3</td>
<td>30</td>
<td>43</td>
<td>0.83</td>
<td></td>
</tr>
<tr>
<td>Week 6</td>
<td>30</td>
<td>44.50</td>
<td>0.97</td>
<td></td>
</tr>
</tbody>
</table>

Table 3- Shows the Analysis of Core Strength mean difference in 1st,3rd and 6th week in Core group. ANOVA single factor using used for analysis,which shows a significant difference in the P value between Core Strength 1st,3rd and 6th week in Core group. This group showed increase in core strength as the week progressed in 6 weeks protocol. It was a gradual progress which was noticed, may be because of primary stabilizers are those muscles which cannot create significant joint movements, such as the lumbar multifidus and transversus abdominis, they act only to stabilize the lumbar spine. There is hypothesis that the stability of the lumbar spine is dependent on correct functioning of the neuromuscular system, if the basic morphology of the lumbar spine is compromised, the neuromuscular system may be trained to compensate, to provide dynamic stability to the spine during the demands of daily living by reducing low back pain [7].

There was a study conducted by Richardson et al divides the core muscle strengthening in to three stages on the principles of ‘segmental stabilization exercises model’. Those were on the basis of motor relearning principle; these exercises stages are first Local segmental control then Close chain segmental control and finally Open chain segmental control and progression into function, may improve core strength [10].

Table 4 – Analysis of core strength 1st,3rd and 6th week in Core with Kinesiotaping Group.

<table>
<thead>
<tr>
<th>Group</th>
<th>Count</th>
<th>Mean</th>
<th>SD</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 1</td>
<td>30</td>
<td>40.50</td>
<td>0.68</td>
<td></td>
</tr>
<tr>
<td>Week 3</td>
<td>30</td>
<td>42.93</td>
<td>0.94</td>
<td></td>
</tr>
<tr>
<td>Week 6</td>
<td>30</td>
<td>45.40</td>
<td>0.93</td>
<td></td>
</tr>
</tbody>
</table>

Table 4- Shows the Analysis of Core Strength mean difference in 1st,3rd and 6th week in Core with Kinesiotaping group. ANOVA single factor using used for analysis,which shows a significant difference in the P value between Core Strength 1st,3rd and 6th week in Core with Kinesiotaping group. This group too showed increase in core strength as the week progressed in 6 weeks protocol, there was not much difference in the mean of core strength in both the groups. In addition, kinesiotaping may corrects muscle function by stretching weak muscles, it improves blood and lymph circulation by eliminating tissue fluid beneath the skin through muscle movement, it may correct the misaligned joints by retrieving muscle spasm and may improve core stability may improve core strength [9].

Table 5- Analysis of mean difference in VAS post intervention in Core and Core with Kinesiotaping group.

<table>
<thead>
<tr>
<th>VAS</th>
<th>Mean</th>
<th>SD</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core</td>
<td>0.03</td>
<td>0.54</td>
<td></td>
</tr>
<tr>
<td>Core with</td>
<td>0.00</td>
<td>0.00</td>
<td>0.33</td>
</tr>
</tbody>
</table>

Table 5- Shows the Analysis of Mean difference in VAS post intervention in Core and Core with Kinesiotaping group. The graph states that the above group unpaired T Test was used for comparison of VAS in Core and Core with Kinesiotaping group. Statically it was concluded that there was no difference in VAS Core as compared to VAS Core with Kinesiotaping.

Table 6- Analysis of mean difference in core strength post intervention in Core and Core with Kinesiotaping group.

<table>
<thead>
<tr>
<th>Core Strength</th>
<th>Mean</th>
<th>SD</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core</td>
<td>44.50</td>
<td>0.97</td>
<td></td>
</tr>
<tr>
<td>Core with</td>
<td>45.40</td>
<td>0.93</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Table 6- Shows the Analysis of mean difference in core strength post intervention between Core and Core with Kinesiotaping group. The graph states that the above group unpaired T Test was used for comparison of core strength in Core and Core with Kinesiotaping group. Statically there was no difference in Core as compare to Core with Kinesiotaping group.
CONCLUSION

The study concluded that statically both the groups had equal effects on reduction of low back pain and improvement of core strength in bharatnatyam dancers.

Conflict of Interest Statement: The authors whose names are mentioned below certify that, we have NO affiliations with or involvement in any organization or entity with any financial interest or non-financial interest in the subject matter or material discussed in this manuscript.

Ethical Clearance: This study was approved by our institutional ethical committee.

Source of Funding: Nil

REFERENCES


Effect of a 6-Week Agility Training Program on Spatiotemporal Parameters in Gait Cycle of Indian Taekwondo Players

Amrinder Singh¹, Abhinav Sathe², Jaspal Singh Sandhu³
¹Assistant Professor, ²Research Scholar, ³Professor  , Faculty of Sports Medicine and Physiotherapy, Guru Nanak Dev University, Amritsar, Punjab, India

ABSTRACT

Background: Taekwondo requires high level of agility, lower limb strength as it helps to improve performance in activities that require you to change direction quickly while keeping balance, strength, speed and body control. The purpose of the study was to determine the effect of a 6 week agility training program on spatiotemporal parameters in gait cycle of Indian taekwondo players. Material and Method: 30 elite national level taekwondo players volunteered and were randomly assigned into two groups, group 1(G1; n = 15) agility training group (mean age 19.60 ± 2.06 years; mean height 1.72 ± 0.08 m; mean mass 57.94 ± 10.27 kg) and group 2 (G2; n = 15) control group (mean age 20.13 ± 1.55; mean height 1.71 ± 0.07 m; mean mass 65.19 ± 16.87). Both agility training group and control group were assessed for GAIT parameters by Zebris FDM Treadmill. Control group had followed their routine training schedule, and agility training group had performed agility training for 6 weeks. After 6 weeks of training post measures were taken. Findings: Significant changes (p < 0.05) were observed in various parameters. Conclusion: This program can be incorporated to improve overall performance in the athletes and can beneficial for athletes who require quick movements while performing their sport such as taekwondo.

Keywords: agility, taekwondo, gait analysis, spatial, temporal, treadmill

INTRODUCTION

The word “Taekwondo” is derived from the Korean word: “Tae” means “to kick” or “Smash with the feet,” “Kwon” implies “punching” or “destroying with the hand or fist,” and “Do” means “way” or “method.” Taekwondo thus is the technique of unarmed combat for self-defense that involves the skillful application of techniques including punching; jumping kicks, blocks, dodges; and parrying actions with hands and feet. Taekwondo is a combat sport emphasizing on kicking techniques and dynamic footwork. Taekwondo is a martial art that in “today” form of self-defense has evolved by combining many different styles of martial arts that existed in Korea.

Taekwondo and other martial art games have a direct link to agility, rhythm, reaction time, and balance because it requires defense against attack from all directions using both sides of their body. Agility has classically been defined simply not only the ability to change direction rapidly [2] but also the ability to change direction rapidly and accurately. [3] A new definition of agility is proposed by Sheppard and Young, 2006 [4] as “a rapid whole-body movement with change of velocity or direction in response to a stimulus” which has relationships with trainable physical qualities such as strength, power, and technique, as well as cognitive components such as visual scanning techniques, visual scanning speed, and anticipation.

Agility testing is generally confined to tests of physical componentssuch as change of direction, speed, or cognitive components such as anticipation and pattern recognition. Agility training is thought to be a re-enforcement of motor programming through neuromuscular conditioning and neural adaptation of muscle spindle, Golgi-tendon...
and joint proprioceptors.[5][6][7] Performance is often dependent on the athlete’s jumping ability during offensive and defensive skills.[8]

The multidimensional movement demands of field and court games dictate a revaluation of the traditional approach to the development of agility. This demands a systematic multifactored approach that results in significant improvement in game speed. Full development of coordinative abilities provides a range of motor skills that can be adapted to deal with sport specific movement demands.[9]

The purpose of the study was to determine the effect of a 6 week agility training program on spatiotemporal parameters in gait cycle of Indian taekwondo players.

**MATERIAL AND METHOD**

Thirty elite national level taekwondo players (mean age 19.86 ± 1.81 years; mean height 1.70 ± 07 m; mean mass 60.36 ± 13.74 kg) volunteered and were randomly assigned into two groups, Group 1 (G1; n = 15) agility training group and Group 2 (G2; n = 15) control group. All testing and training procedures, benefits, and potential risks of the study were explained to the participants before signing the informed consent form and starting the test. “This study was approved by the Institutional Ethics Committee of Faculty of Sports Medicine and Physiotherapy, Guru Nanak Dev University, Amritsar. Each participant voluntarily provided written informed consent before participating.” The inclusion criteria included the following: participants agreed with the purpose of this study, participants had no existing musculoskeletal problems such as lower limb fracture and sprain/strain, participants had no recent injury to lower limb, and participants had no existing medical problems.

The participants of the study were randomly divided into two groups: Group 1 (G1; n = 15) agility training group and Group 2 (G2; n = 15) control group. All participants agreed not to change or increase their current exercise habits during the course of the study. The agility training group participated in a 6-week exercise program performing a variety of agility exercises designed [Table 1].[10] while the control group followed their routine training schedule. The agility training group performed a 5-min warm-up protocol consisting of general stretching, high knees, heel-ups, and carioca drill before each session. Participants were tested before and after the 6-week training period. The procedure was conducted using the Zebris FDM Treadmill. Machine in which the subject was made to run barefoot on a set speed 2.7 meter/second on the treadmill .The various gait parameters including the spatial and temporal and other set parameters were considered in the reporting. The procedure was conducted before and after for all the subjects as shown in figures 1-2.

The below described is the 6-week agility training protocol:

**Table 1: 6-week exercise program performed by the Subjects in the Agility Group**

<table>
<thead>
<tr>
<th>Time Session</th>
<th>Agility Training</th>
<th>Set/Repetitions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 2 [Day 4-6 ]</td>
<td>Same as Week 1</td>
<td>5 Sets of 10 Repetitions</td>
</tr>
<tr>
<td>Week 3 [Day 7-9 ]</td>
<td>40 – Yard Square – Carioca 15- Yard Turn Drill Figure Eights Z – Pattern Run Zigzag</td>
<td>3 Sets of 10 Repetitions</td>
</tr>
<tr>
<td>Week 4 [Day 10-12 ]</td>
<td>Same as Week 3</td>
<td>5 Sets of 10 Repetitions</td>
</tr>
<tr>
<td>Week 6 [Day 16-18 ]</td>
<td>Same as Week 5</td>
<td>Sets of 10 Repetitions</td>
</tr>
</tbody>
</table>
**Figure 1:** The Subject Running on the Treadmill  
**Figure 2:** The Data Displayed on the Screen

**FINDINGS**

Table 2: Shows the Spatiotemporal Parameters in the Experimental and Control Group

<table>
<thead>
<tr>
<th>Variable</th>
<th>Pre</th>
<th>Post</th>
<th>T-Value</th>
<th>P-Value</th>
<th>Pre</th>
<th>Post</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GLOBAL</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Velocity</td>
<td>6.54±1.80</td>
<td>6.48±2.02</td>
<td>0.08</td>
<td>0.93</td>
<td>6.90±1.29</td>
<td>4.81±1.31</td>
<td>4.39</td>
<td>0.001*</td>
</tr>
<tr>
<td>Cadence(Steps/Min)</td>
<td>161.07±32.42</td>
<td>153.73±25.67</td>
<td>0.68</td>
<td>0.49</td>
<td>154.13±20.27</td>
<td>126.40±19.69</td>
<td>3.80</td>
<td>0.001*</td>
</tr>
<tr>
<td><strong>SPATIAL</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stride Length</td>
<td>136±28.69</td>
<td>142.87±29.34</td>
<td>0.64</td>
<td>0.52</td>
<td>157.33±28.50</td>
<td>126.93±26.29</td>
<td>3.03</td>
<td>0.001*</td>
</tr>
<tr>
<td>Step Width</td>
<td>161.07±32.42</td>
<td>153.73±25.67</td>
<td>0.68</td>
<td>0.49</td>
<td>154.13±20.27</td>
<td>126.40±19.69</td>
<td>3.80</td>
<td>0.001*</td>
</tr>
<tr>
<td>Step Length(Left)</td>
<td>68.60±14.49</td>
<td>71.00±14.79</td>
<td>0.30</td>
<td>0.76</td>
<td>46.47±11.88</td>
<td>62.87±12.69</td>
<td>3.03</td>
<td>0.001*</td>
</tr>
<tr>
<td>Step Length(Right)</td>
<td>67.67±13.89</td>
<td>71.00±14.79</td>
<td>0.63</td>
<td>0.53</td>
<td>76.27±11.11</td>
<td>62.27±11.55</td>
<td>3.38</td>
<td>0.001*</td>
</tr>
<tr>
<td>Foot Rotation(Left)</td>
<td>0.10±4.96</td>
<td>1.56±4.11</td>
<td>0.93</td>
<td>0.35</td>
<td>0.99±3.92</td>
<td>2.35±3.76</td>
<td>0.96</td>
<td>0.34</td>
</tr>
<tr>
<td>Foot Rotation(Right)</td>
<td>0.77±5.71</td>
<td>2.99±4.51</td>
<td>1.18</td>
<td>0.24</td>
<td>2.02±5.35</td>
<td>4.21±3.07</td>
<td>1.37</td>
<td>0.18</td>
</tr>
<tr>
<td>Length of Gait Line(Left)</td>
<td>187.33±65.71</td>
<td>206.33±65.71</td>
<td>0.93</td>
<td>0.35</td>
<td>217.93±51.82</td>
<td>223.73±25.97</td>
<td>0.38</td>
<td>0.70</td>
</tr>
<tr>
<td>Length of Gait Line(Right)</td>
<td>182.07±68.84</td>
<td>193.20±45.83</td>
<td>0.52</td>
<td>0.60</td>
<td>214.53±51.66</td>
<td>216.73±20.95</td>
<td>0.15</td>
<td>0.88</td>
</tr>
<tr>
<td>Single Support Line (Left)</td>
<td>130.07±51.02</td>
<td>145.93±36.19</td>
<td>0.98</td>
<td>0.33</td>
<td>158.80±43.15</td>
<td>154.73±31.62</td>
<td>0.29</td>
<td>0.77</td>
</tr>
<tr>
<td>Single Support Line (Right)</td>
<td>134.67±48.49</td>
<td>143.80±35.84</td>
<td>0.58</td>
<td>0.56</td>
<td>167.07±41.58</td>
<td>161.67±32.87</td>
<td>0.39</td>
<td>0.69</td>
</tr>
<tr>
<td>Anterior/Posterior Position</td>
<td>170.53±35.33</td>
<td>183.53±26.36</td>
<td>1.14</td>
<td>0.26</td>
<td>178.53±32.04</td>
<td>166.20±22.04</td>
<td>1.22</td>
<td>0.23</td>
</tr>
<tr>
<td>Lateral Symmetry</td>
<td>1.47±6.17</td>
<td>0.60±4.18</td>
<td>0.45</td>
<td>0.65</td>
<td>0.47±3.76</td>
<td>3.20±3.36</td>
<td>2.09</td>
<td>0.04*</td>
</tr>
<tr>
<td><strong>TEMPORAL</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stance Phase % (Left)</td>
<td>50.34±8.11</td>
<td>53.23±7.28</td>
<td>1.02</td>
<td>0.31</td>
<td>51.84±7.39</td>
<td>59.59±5.12</td>
<td>3.33</td>
<td>0.001*</td>
</tr>
<tr>
<td>Stance Phase % (Right)</td>
<td>50.26±8.41</td>
<td>52.91±7.34</td>
<td>0.91</td>
<td>0.36</td>
<td>51.12±8.09</td>
<td>59.75±5.14</td>
<td>3.50</td>
<td>0.001*</td>
</tr>
<tr>
<td>Load Response % (Left)</td>
<td>4.79±4.46</td>
<td>5.81±4.16</td>
<td>0.64</td>
<td>0.52</td>
<td>5.00±3.69</td>
<td>8.85±4.30</td>
<td>2.62</td>
<td>0.01*</td>
</tr>
<tr>
<td>Load Response % (Right)</td>
<td>4.70±4.58</td>
<td>5.57±4.48</td>
<td>0.52</td>
<td>0.60</td>
<td>5.06±3.66</td>
<td>8.94±4.45</td>
<td>2.60</td>
<td>0.01*</td>
</tr>
<tr>
<td>Mid Stance % (Left)</td>
<td>41.60±2.34</td>
<td>42.62±3.13</td>
<td>1</td>
<td>0.32</td>
<td>43.73±3.25</td>
<td>40.15±3.28</td>
<td>2.99</td>
<td>0.001*</td>
</tr>
<tr>
<td>Mid Stance % (Right)</td>
<td>41.50±3.24</td>
<td>42.54±2.79</td>
<td>0.94</td>
<td>0.35</td>
<td>43.27±3.16</td>
<td>39.89±3.79</td>
<td>2.64</td>
<td>0.001*</td>
</tr>
<tr>
<td>Pre-Swing % (Left)</td>
<td>4.31±4.72</td>
<td>4.53±3.86</td>
<td>0.13</td>
<td>0.89</td>
<td>4.75±3.87</td>
<td>8.25±4.31</td>
<td>2.33</td>
<td>0.02*</td>
</tr>
<tr>
<td>Pre-Swing % (Right)</td>
<td>4.43±4.62</td>
<td>6.13±3.82</td>
<td>1.10</td>
<td>0.28</td>
<td>4.73±3.86</td>
<td>9.24±3.90</td>
<td>3.18</td>
<td>0.001*</td>
</tr>
<tr>
<td>Swing Phase % (Left)</td>
<td>49.66±8.11</td>
<td>46.90±7.66</td>
<td>0.95</td>
<td>0.34</td>
<td>47.13±6.23</td>
<td>41.28±5.69</td>
<td>2.68</td>
<td>0.01*</td>
</tr>
</tbody>
</table>
The biomechanical variables included the parameters such as the centre of pressure parameters, gait phase parameters, spatial gait parameters and temporal gait parameters. Significant differences were found in the following parameters: lateral symmetry (mm), left stance phase (%), right stance phase (%), left load response (%), right load response (%), left mid stance (%), right mid stance (%), left pre-swing (%), right pre-swing (%), left swing phase (%), right swing phase (%), double stance (%), left and right step length, stride length(cm), cadence(steps/min), velocity. There is very less literature available in context to gait analysis and its correlation to agility training. The present study was in accordance to Kerrigan & Casey, 2005 who had studied and stated that it is useful not only to sort through the gait analysis and identify the patient’s specific impairments but also to define how the measured impairments affect the patients overall function and predict the effectiveness of clinical interventions. The parameters such as the length of gait line, single support line, anterior/posterior position, foot rotation, step width, step time, stride time showed non significant differences. Lloyd F Reed, 2013 in their findings provided clinicians and researchers with an indication of the repeatability and sensitivity of the Zebris treadmill system to detect changes in common spatiotemporal gait parameters and vertical ground reaction forces. This can be a possible reason for the significant findings in our study as the same equipment has been used in the present as well as the above stated study.

Therefore, in our study, participants who underwent agility training were able to improve their physical variables significantly. We found a positive relationship between agility training and improvements of the variables. This improvement in agility is beneficial for athletes who require quick movements while performing their sport such as taekwondo. Regular participation in an agility training program can improve measures of various variables associated with the sport.

**CONCLUSION**

The results from our study are very encouraging and demonstrate that the benefits agility training can have on performance. Not only can players use agility to break the monotony of training, but they can also improve their specific skills while working to become more agile. In addition, our results support that improvements in agility can occur in as little as 6 weeks of agility training which can be useful during the last preparatory phase before in-season competition for taekwondo players and this study also showed how new techniques can be used to analyze one’s performance which shall be helpful for oneself to be away from injury.

**Conflicts of Interest:** There are no conflicts of interest.

**Source of Funding:** The set-up was organized by the Department of Sports Medicine and Physiotherapy, Guru Nanak Dev University Amritsar, Punjab, India.

**REFERENCES**


6. Craig, b.w. (2004) what is the scientific basis of

7. Potteiger, j.a., lockwood, r.h., haub, m.d., dolezal, b.a., alumzaini, k.s., Schroeder, j.m. and zebas, c.j. (1999) muscle power and fiber characteristic following 8 weeks of plyometric training. Journal of strength and conditioning research 13, 275-279.


A Study to Ascertain Normative Value for Two-Point Discrimination Ability for the Lower Limb among Healthy Indian Middle-Aged Population: A Pilot Study

Lekshmi Vijayan¹, Smitha D²

¹Postgraduate, ²Associate Professor, Yenepoya Physiotherapy College, Yenepoya (Deemed To Be University), Mangalore

ABSTRACT

Background: Two-point discrimination addresses the sensitivity of overlying receptive fields on the body surfaces and is often used as a reliable method to examine somatic sensibility. According to age and which part of the body is measured the distance used in the TPD varies. Alteration in TPD in lower limb is seen in many conditions like diabetic neuropathy and in some chronic pain conditions such as complex regional pain syndrome, phantom limb pain and chronic low back pain. Most of these conditions are more prone to occur between the ages of 40 to 65 years.

Method: Eighty-four apparently normal subjects comprising of forty-two men and forty-two women were recruited conveniently for the study. Eleven sensory areas in lower extremity were selected which covers all major dermatomes. The ability to distinguish the two-points was estimated by using aesthesiometer in centimeters.

Results: The reference value of two-point discrimination for the eleven sensory areas of lower limb was established. There exists significant (p<0.05) difference in the reference values between men and women and no difference in right and left side values among Indian adults.

Conclusion: The normal value of two-point discrimination for the lower limb among healthy Indian middle-aged population was established. The men and women discriminate the two-point sensation significantly and there exist gender differences. There exists no difference in right and left side in both men and women.

Keywords: Two-point discrimination, aesthesiometer, sensory areas of the lower limb.

INTRODUCTION

Sensory information from a variety of environmental input as well as from movement, touch, awareness of the body in space, sight, sound, and smell is continually inundating human system. Sensory integrity is examined by determining the patient’s ability to interpret and discriminate among incoming sensory information.¹ The two-point discrimination (TPD) is a sensory discrimination modality that measures minimal distance at which an individual perceives two points of stimuli presented simultaneously with the same pressure. According to age and which part of the body is measured the distance used in the TPD varies. It is often used as a reliable method to examine somatic sensibility.¹

Tactile sensation protects our body from harmful stimuli by transmitting external stimuli from the skin to the central nerve. It also converts external stimuli to electric signals and sends them to the sensorimotor cortex via sensory nerves and the spinal cord. Thus, the assessment of tactile sensation helps to evaluate the function of the peripheral nervous system and the

Corresponding author:
Smitha D,
Associate Professor, Yenepoya Physiotherapy College, Yenepoya(Deemed To Be University), Mangalore – 575018 E-mail- smithad@yenepoya.edu.in
Fax no: 0824-2203689
central nervous system. If any lesions occur in the somatic sense, they might result in decline or loss of discriminative sensation. The distance used in the TPD varies according to which part of the body is measured: 1 mm on the tongue, 2–6 mm on the tips of fingers, 8–12 mm on the palm, and 400–600 mm on the back.

An instrument used to measure TPD is aesthesiometer. Aesthesiometer consists of a small ruler with two moveable (sliding) tips coated with vinyl. The vinyl coverings help to minimize the impact of temperature on a perception of contact. It is a small hand-held instrument designed to measure the shortest distance that two points of contact on the skin can be distinguished. Normative values are extremely useful in interpreting test result from sensory assessments.

Nolan MF did a study in 1983 and established the normative value for two-point discrimination sensitivity in 11 skin areas in lower limb on the healthy subjects only in the age of 20 to 24 years. JA Pung Koo et al (2016) did a study to measure TPD in the upper extremities of healthy Koreans in their 20’s and suggested that females have TPD at a shorter distance than males and also females showed greater TPD than males in distal regions rather than proximal regions. Kannathu Shibin et al in 2013 did a study and established the normal value of TPD for upper extremity among 18 to 28 years Indian adults and suggested that men and women discriminate the two-point sensation in a similar way and there exist no gender differences. G.Valagussa et al (2016) did a study to assess TPD values of thigh, lower leg and foot in both lower limbs in a healthy cohort and the secondary purpose were to assess the correlation between each segment of both lower limbs and whether if these values are influenced by gender, dominance, height, and body mass index and they suggested that TPD of each segment of both lower limbs in each subject has good correlation between the right and left sides. TPD values were not influenced by gender or dominance and no correlation found between TPD values and height or BMI.

As sensations are influenced by advanced aging and there are many conditions known to alter the lower limb sensations between the ages of 40 to 65, it is very important to know the normal value of two-point discrimination in lower limb in healthy subjects to determine an alteration in normative value. In evaluating nerve injuries of the foot and post-surgical cases its help is immense. In spinal cord injuries and parietal lobe lesions, there is a reduction in two-point discrimination values. Combined cortical sensations are assessed in clinical settings to know whether the higher centers are affected or nerve is intact. For other combined cortical sensations like stereognosis, baragnosis, graphesthesia, bilateral simultaneous stimulation, recognition of texture, tactile localization we can’t establish a normative value. So establishing the normative value for two-point discrimination will be useful in clinical assessments and may guide in the rehabilitation process. The value can also be used to monitor the patient’s recovery and response to treatment. There is a study that has been done to establish normative data for TPD for age group above 65 years, but no study has been done in the age group of 40 to 65; therefore, the purpose of this study is to establish normative value for two-point discrimination for lower limb in healthy Indian men and women of age group 40 to 65 years.

**MATERIALS AND METHOD**

This study was conducted among bystanders of the patients of Yenepoya medical college hospital and staffs of Yenepoya medical college hospital between 40 to 65 years with a sample size of 84. Purposive sampling was done to recruit the participants into the study. Prior to participation, the participants were explained about the study and an informed consent was obtained from them. Ethical clearance was obtained from University ethics committee. Participants were screened based on the inclusion and exclusion criteria. Inclusion criteria were: Participants with age range of 40 to 65 years, participants who are independent in activities of daily living, participants with no sensory symptoms, participants without skin disease, scar, burns or dermal hypersensitivity, participants with normal sensory modalities (pain, touch, temperature) and tendon reflexes. Participants having musculoskeletal system diseases in the lower limb, participants with a history of any mental or psychological illness, participants with the history of alcohol abuse, participants with the history of usage of drugs or history of diseases which may cause sensory deficit or influence cooperation were excluded from the study.

Procedure: For all the participants 11 sensory areas of lower limbs innervated by specific nerves of the lumbar plexus was tested. Skin area tested was proximal anterior thigh, distal-anterior thigh, mid-lateral thigh, mid-medial thigh, mid-posterior thigh, proximal-lateral
thigh, distal-lateral thigh, medial leg, top of the great toe, over 1st-2nd metatarsal interspaces, over 5th metatarsal. A small handheld aesthesiometer was used to measure the distance.

During testing, the participants were on a plinth in the supine position. Positioning for testing the thigh and leg was with the lower limb flexed at the hip and knee and the foot resting flat on the table. For testing the skin areas on foot, the lower limb was straightened and placed comfortably on the table. The assessment was done on both the lower limbs.²

Touch stimuli were applied to each skin area in random order. A minimum of 20 times with approximately 2 seconds was allowed between each application.² Pressure that depresses the skin no more than 1mm was considered appropriate. To reduce the possibility of accommodation to the test stimuli, touching exact same point on the skin more than once was avoided during the testing of that particular area.² The subjects were asked to give their best response of one point or two points as the stimulus is applied to the skin. The smallest distance at which each volunteer could readily differentiate between the application of one or two points were determined for each of the test areas by using this method.²

**RESULTS**

Statistical analysis was analyzed using unpaired t test between males and females. The statistical software SPSS version 22 was used to analyze the data. P< 0.05 was defined to have represented a significant difference with confidence interval 95%.

**Table 1: TPD in 11 sensory areas of right and left side in females and males**

<table>
<thead>
<tr>
<th>Sensory Areas</th>
<th>Mean(F)cm</th>
<th>Mean(M)cm</th>
<th>SD(F)</th>
<th>SD(M)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rt</td>
<td>Lt</td>
<td>Rt</td>
<td>Lt</td>
</tr>
<tr>
<td>Proximal anterior thigh</td>
<td>2.071</td>
<td>2.071</td>
<td>2.590</td>
<td>2.590</td>
</tr>
<tr>
<td>Distal anterior thigh</td>
<td>1.705</td>
<td>1.705</td>
<td>2.245</td>
<td>2.245</td>
</tr>
<tr>
<td>Mid lateral thigh</td>
<td>2.181</td>
<td>2.181</td>
<td>2.831</td>
<td>2.831</td>
</tr>
<tr>
<td>Mid posterior thigh</td>
<td>1.950</td>
<td>1.950</td>
<td>2.788</td>
<td>2.788</td>
</tr>
<tr>
<td>Proximal lateral thigh</td>
<td>1.736</td>
<td>1.736</td>
<td>2.560</td>
<td>2.560</td>
</tr>
<tr>
<td>Distal lateral thigh</td>
<td>1.769</td>
<td>1.769</td>
<td>2.555</td>
<td>2.555</td>
</tr>
<tr>
<td>Medial leg</td>
<td>1.914</td>
<td>1.914</td>
<td>2.348</td>
<td>2.348</td>
</tr>
<tr>
<td>Tip of great toe</td>
<td>1.040</td>
<td>1.040</td>
<td>1.560</td>
<td>1.560</td>
</tr>
<tr>
<td>1st-2nd MT interspace</td>
<td>1.219</td>
<td>1.219</td>
<td>1.731</td>
<td>1.731</td>
</tr>
<tr>
<td>5th MT</td>
<td>1.271</td>
<td>1.271</td>
<td>1.788</td>
<td>1.788</td>
</tr>
</tbody>
</table>

SD- Standard Deviation, Rt- Right, Lt- Left, F- Females, M- Males, cm- Centimeters, MT- Metatarsal

The above table shows the mean values of 11 sensory areas of right and left side in females and males. The value shows no difference between right and left side in both females and males and the mean values on the right and left sides of males are higher compared to females.
Table 2: Comparison of right and left side mean values between males and females

<table>
<thead>
<tr>
<th>Sensory Areas</th>
<th>Right t value</th>
<th>Right P value</th>
<th>Left t value</th>
<th>Left P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proximal anterior thigh</td>
<td>-12.914</td>
<td>.001*</td>
<td>-12.914</td>
<td>.001*</td>
</tr>
<tr>
<td>Distal anterior thigh</td>
<td>-12.194</td>
<td>.001*</td>
<td>-12.194</td>
<td>.001*</td>
</tr>
<tr>
<td>Mid lateral thigh</td>
<td>-13.739</td>
<td>.001*</td>
<td>-13.739</td>
<td>.001*</td>
</tr>
<tr>
<td>Mid medial thigh</td>
<td>-18.199</td>
<td>.001*</td>
<td>-18.199</td>
<td>.001*</td>
</tr>
<tr>
<td>Mid posterior thigh</td>
<td>-16.793</td>
<td>.001*</td>
<td>-16.793</td>
<td>.001*</td>
</tr>
<tr>
<td>Proximal lateral thigh</td>
<td>-15.171</td>
<td>.001*</td>
<td>-15.171</td>
<td>.001*</td>
</tr>
<tr>
<td>Distal lateral thigh</td>
<td>-13.737</td>
<td>.001*</td>
<td>-13.737</td>
<td>.001*</td>
</tr>
<tr>
<td>Medial leg</td>
<td>-7.755</td>
<td>.001*</td>
<td>-7.755</td>
<td>.001*</td>
</tr>
<tr>
<td>Tip of great toe</td>
<td>-14.855</td>
<td>.001*</td>
<td>-14.855</td>
<td>.001*</td>
</tr>
<tr>
<td>1st-2nd MT interspace</td>
<td>-14.340</td>
<td>.001*</td>
<td>-14.340</td>
<td>.001*</td>
</tr>
<tr>
<td>5th MT</td>
<td>-13.698</td>
<td>.001*</td>
<td>-13.698</td>
<td>.001*</td>
</tr>
</tbody>
</table>

* Statistically significant (p<0.05)

DISCUSSION

For patients with cutaneous sensory dysfunction, assessment of the nature and extent of the deficit are important components of the rehabilitation program. In the clinical setting, two-point discrimination ability is not difficult to measure objectively and requires little practice for accurate and reliable measurements. Therefore, two-point testing can be an easily mastered assessment technique that is available to the practicing clinician.

The current study provides knowledge about normative value for two-point discrimination ability for lower limb among healthy Indian middle-aged population using aesthesiometer in eleven different skin areas of the limb innervated by specific nerves of the lumbosacral plexus. The study aimed to establish normative value in healthy Indian men and women of age group 40 to 65 years.

The age group for the present study was middle-age which is more prone to many of the conditions like diabetic neuropathy, chronic pain conditions such as complex regional pain syndrome, phantom limb pain and chronic low back pain. So establishing normative value in this age group will be more helpful in early disease identification. Nolan M in 1983 did a similar study to determine the limits of two-point discrimination ability in lower limb in a sample of healthy, young adult’s men and women ranging in age from 20 to 24. The method of testing of our study was identical to that used by Nolan in 1983.

In the current study, the discrimination of the two-point touch sensitivity on the right and left sides of both males and females were compared and suggest that no difference exists. A previous study by Nolan revealed that for most skin areas examined, values obtained for men and women in the sample were not significantly different. According to his study women were significantly better than men in their two-point discrimination ability for skin over the mid-posterior thigh, the 1st and 2nd metatarsal interspace, and the 5th metatarsal. The present study compared the values for men and women to identify differences in two-point discrimination ability related to sex. Statistical analyses revealed that for all skin areas examined, values obtained for men and women in the sample were significantly different (p<0.05). According to our study women are more sensitive than men in all 11 sensory areas tested. This differences may be due to the reduced density of epidermal nerve fibers with age which is lower in men compared to women. Testing methods, data collection, and interpretation were identical for all subjects in present
study. The study results showed an interindividual and intra-individual variation in two-point discrimination for a given area of skin. The study by Nolan in 1983 also showed a similar result. Such a similar result was also found in the upper limb. For the practicing therapist, the knowledge that interindividual difference exist is very important. These variations suggest that caution is necessary when interpreting the results from patients with alterations in cutaneous sensibility.

G Valagussa et al did a study to provide two-point discrimination mean values for each segment of the lower limb in the healthy subject with a mean age of ±30.42 and found slight variations between the right and left side of all the three segments of the lower limb. This study suggests that left side is having lesser two-point discrimination values compared to the right side and the variation is possibly due to the right side dominance in the subjects. The current study also compared the mean values of both male and females in right and left side and found that no difference exists. Our results suggest that the right and left sides of both the males and females are having equal sensitivity and no difference in dominance exists in the lower limb. The limitations of our study were that the sample size was small and the participants were selected only from one medical college hospital.

CONCLUSION

The reference value of two-point discrimination is established in the lower limb in a sample of healthy, middle-aged adult men and women. The results demonstrate that discrimination ability varied in different skin areas within the same individual. The values vary between males and females with females being more sensitive than males. There exists no difference between right and left side in both males and females. The availability of this reference values for this type of sensation will assist the clinician in the assessment of selected patient populations.

Conflict of Interest: There is no conflict of interest.

Source of Funding: Self

Ethical Clearance: Yenepoya (Deemed To Be University) Ethics Committee

REFERENCES

Effects of Modified Sit to Stand Training with Mental Practice on Balance and Gait in Post Stroke Patients

Suchetha P S¹, Supriya B², Kovela Rakesh Krishna³
¹Assistant Professor, ²Post Graduate, ³Assistant Professor, Nitte Institute of Physiotherapy, Nitte (deemed to be) University, Mangalore, Karnataka

ABSTRACT

Background: Difficulty in balance and gait are the common problems following stroke which can limit the patient’s functional independence. Modified sit to stand training by placing the paretic foot posteriorly benefits the patient in symmetrical weight bearing. Mental practice is a relatively new therapy, which is the symbolic rehearsal of a physical activity in the absence of any gross muscular movements.

Objectives: To determine the Effects of modified sit to stand training with mental practice on balance and gait in post stroke patients

Method: 28 patients satisfying the inclusion criteria were randomly assigned into 2 groups. Experimental group received modified sit to stand training and mental practice along with the conventional therapy. Each group received intervention for 1 hour session/day for 5 days a week for 2 weeks. Balance was measured using Berg Balance Scale and Gait was measured using Dynamic Gait Index.

Results: Both the groups showed significant improvement in the balance and gait components in post training compared to pre training. After the intervention, BBS was highly significant with the p value 0.000 (p<0.001) in the experimental group compared to control group and DGI was statistically significant with the p value 0.003 (p<0.005) in experimental group than in the control group.

Conclusion: Modified sit to stand training with mental practice is effective on balance and gait in post stroke patients.

Keywords: modified sit to stand, mental practice, balance, stroke

INTRODUCTION

Stroke is a disease of vascular aetiology associated with neurological deficits. Severity of neurological deficits differ from person to person depends on the location and extent of lesion.¹ Amongst the manifestations after stroke, the most common is paralysis of the limbs on one side, as result patients with hemiplegia have asymmetric weight bearing on one side, which can lead to balance deficits.²

Difficulties in balancing are commonly seen in post stroke individuals. This results in significant ambulatory dysfunction, dependence on others for daily living activities and increased risk of fall. Increased swaying, decreased weight bearing on affected leg and poor weight shifting are common balance problems.³ It can lead to numerous problems such as difficulty in walking, sitting, and standing which in turn leads to increased weight transfer on the non-paretic leg compared to the paretic leg.³

Gait asymmetry is associated with a number of complications such as inefficiency, challenges to balance control, risk of musculoskeletal injury to the non-paretic lower limb and loss of bone mass density in the paretic lower limb. Therefore, recovery of balance and gait

DOI Number: 10.5958/0973-5674.2018.00073.4
ability is a critical goal in stroke rehabilitation.5

Sit to stand movement is one of the essential activities of daily life which is required for assuming an upright posture and initiate walking. It is also required for the maintenance of an individual’s independence. Following an event of stroke the ability to rise to stand independently is hampered and that can limit the functional independence6.

The training of sit to stand task is often initiated during the early phase of rehabilitation. The practice of this movement, through strategies that promote the weight bearing on the affected leg, can provide benefits for the return of more functional movements and prevention of falls and the acquired non-use of the affected limb.7,8

Studies have noted that by placing the paretic foot posterior in stroke patients, the paretic lower limb loading can be increased and symmetry of weight bearing distribution can be maintained between both the lower limbs during sit to stand movements.9,10

Modified sit to stand is a method in which the paretic foot is placed back, with 15 degree of relative ankle dorsiflexion and positioned at a distance corresponding to 50% of the subject’s foot length while the non-paretic foot is kept in front with 0 degree of ankle dorsiflexion and 90 degree flexion at the knee.4

Mental practice is the act of performing the skill in one’s imagination with no action involved. In other words, mentally rehearsing the movement of the affected body parts, without actually attempting to perform the movement.11,12 Recent advances in neuroscience provide evidence that mental practice activates the same areas of the brain which are involved during the physical execution of the same task.13-15

METHODOLOGY

A total 52 stroke subjects were screened for eligibility. Out of which 22 subjects were excluded as they did not meet the inclusion criteria. 30 patients fulfilling the inclusion criteria were enrolled in the study. The criteria for inclusion were:

Patients with 0 to 6 months first time stroke with unilateral involvement, age: 40-70 years, both male and female subjects, having Berg balance scale score between 25-48. Patients were excluded if they had other neurological disorders, Musculo-skeletal disorders like OA, RA, fracture of lower limbs and joint pain, non co-operative patients and patients with mini mental state examination score < 21. The study was approved by the Institutional Ethical Committee. The informed consent was obtained from the subjects prior to the intervention.

Pre and post-test with control group study design was used. A total of 30 Subjects were randomly divided into experimental group and control group based on computer generated random numbers. Baseline measurements were taken prior to the intervention and post-test measurements were recorded at the end of week 2. Two patients could not complete the study as one patient experienced second attack of stroke and another patient got discharged against the medical advice. Balance and Gait variables of the patients were measured by using Berg balance scale (BBS)16 and Dynamic gait index (DGI).17

Intervention:

Both the groups received 1 hour of supervised exercise programme for 5 days a week for 2 weeks.

Experimental group received 30 minutes of conventional treatment and 15 min of modified sit to stand training followed by 15 minutes of mental practice. Conventional treatment included active and passive range of motion exercises, Stretching, strengthening, PNF exercises, functional mobility exercises, weight bearing and weight shifting activities & Breathing exercises.

In modified sit to stand training, the patient was asked to sit on the chair with his paretic foot placed in 15 degrees of relative dorsiflexion and positioned behind the unaffected foot at a distance corresponding to 50% of his/her foot length while the non-paretic foot is kept in front with 0 degree of ankle dorsiflexion and 90 degree of knee flexion. It is followed by asking the patient to imagine the previously performed modified sit to stand movement for 15 minutes. During the mental practice, patients were required to close their eyes and imagine modified sit to stand activity. The patients in the control group received above mentioned conventional treatment for one hour based on the individual assessment.
The data was analysed using the SPSS software 16.0 version. Descriptive data analysis was performed for the collected variables of the subjects. Paired t test was used to compare within the group differences of the Experimental and control group on Berg Balance scale. Wilcoxon signed rank test was used to compare within the group differences of the Experimental and control group for the Dynamic Gait Index. The independent sample t test was used to compare between the group difference of experimental and control group before and after the intervention for Berg Balance Scale and Mann-Whitney U test was used for Dynamic Gait Index. The level of significance was considered at p < 0.05.

**RESULTS**

A total of 30 patients were included in the study, there were 2 dropouts. Hence data was analysed from 28 stroke patients who were allocated to experimental group (n=14) & control group (n=14). The demographic data of the study population given in Table 1. Chi-square analysis revealed that there was homogeneous distribution of baseline variables among both the groups in terms of age, gender, side of affection and pre-test measurements of Berg balance score & Dynamic gait index.

**Table 1: Baseline demographic characteristics of the control and experimental groups**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Experimental group</th>
<th>Control group</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>56.85 ±12.01</td>
<td>64.50 ± 8.06</td>
<td>0.059</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>6</td>
<td>8</td>
<td>0.45</td>
</tr>
<tr>
<td>Male</td>
<td>8</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Side affected</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Left</td>
<td>6</td>
<td>9</td>
<td>0.256</td>
</tr>
<tr>
<td>Right</td>
<td>8</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

**Data Interpretation of outcome measures within the group**

Paired t test used to compare within the group differences of the Experimental group and Control group of Berg Balance scale scores. (Table 2)

Within-group comparison showed a significant improvement in BBS in both groups (p < 0.001). The mean improvement in Experimental group was 12.21 whereas in control group was 6.78.
Wilcoxon rank sign test was used for the comparison of Dynamic Gait Index scores within the group. In Experimental group, before intervention median was found 9.00 with interquartile range from 5.75 to 11.25 and after intervention median was 17.00 with interquartile range from 12.50 to 18.00. The p value obtained is 0.001 which is statistically significant. In Control group, before intervention median was found 6.00 with interquartile range from 2.00 to 9.25 and after intervention median was 9.00 with interquartile range from 4.75 to 13.25. The p value obtained was 0.001, which is statistically significant.

**Table 3: Wilcoxon rank sign test of DGI values within the groups**

<table>
<thead>
<tr>
<th>Group</th>
<th>Variables</th>
<th>Median</th>
<th>IQR</th>
<th>Z value</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental</td>
<td>Pre DGI</td>
<td>9.00</td>
<td>5.75 to 11.25</td>
<td>-3.30</td>
<td>0.001 (&lt;0.005)</td>
</tr>
<tr>
<td></td>
<td>Post DGI</td>
<td>17.00</td>
<td>12.50 to 18.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>Pre DGI</td>
<td>6.00</td>
<td>2.00 to 9.25</td>
<td>-3.20</td>
<td>0.001 (&lt;0.005)</td>
</tr>
<tr>
<td></td>
<td>Post DGI</td>
<td>9.00</td>
<td>4.75 to 13.25</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Interpretation of outcome measures between the groups**

Independent t test was used to compare the effectiveness of intervention between the groups using Berg Balance Scale.

The mean difference between the groups for Berg Balance Scale was 5.42 with the p value <0.001 which is statistically significant.

**Table 4: Independent t test values for BBS score between the groups**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Group</th>
<th>Mean</th>
<th>S.D</th>
<th>Mean difference</th>
<th>t value</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>BBS difference</td>
<td>Experimental Group</td>
<td>12.21</td>
<td>3.37</td>
<td>5.42</td>
<td>4.08</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>Control Group</td>
<td>6.78</td>
<td>3.64</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Mann Whitney U test was used for the comparison between both the groups for Dynamic Gait Index. The median was 7.50 and 3.00 for the Experimental group and Control group respectively. Z value was -3.01 and p value was 0.003, which is statistically significant.

**Table 5: Mann Whitney U test values for DGI between the groups**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Group</th>
<th>Mean</th>
<th>S.D</th>
<th>Median</th>
<th>IQR</th>
<th>Z value</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>DGI difference</td>
<td>Experimental Group</td>
<td>6.42</td>
<td>2.65</td>
<td>7.50</td>
<td>4.00 to 8.25</td>
<td>-3.01</td>
<td>0.003</td>
</tr>
<tr>
<td></td>
<td>Control Group</td>
<td>3.21</td>
<td>1.96</td>
<td>3.00</td>
<td>2.00 to 4.00</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
DISCUSSION

Difficulty in Balance and Gait in individuals following stroke are the most common symptoms which can lead to numerous problems in activities of daily living. Hence this study was designed to determine the effects of modified sit to stand training with mental practice on balance and gait in post stroke patients. The statistical analysis of data showed a significant improvement in balance and gait in the experimental group compared to the control group in both the outcome measures (BBS and DGI). Thus, as per our results we accept our research hypothesis, which states that Modified sit to stand with mental practice is effective on balance and gait in post stroke patients.

Meng Liu et.al (2015) concluded that practicing the sit to stand training by keeping the paretic foot behind the non-paretic foot is found to be more effective in retraining the balance and mobility than keeping the feet side by side. In that study, three programmes of sit to stand training are designed by altering the dorsiflexion range for 30 minutes. In our study sit to stand training followed by mental practice was given which showed greater improvement in the performance of the patients in the experimental group compared to the control group.

Jae Hyo Park et.al (2015) concluded that asymmetrical sit to stand training alone increases the static and dynamic balance in chronic stroke patients. Whereas in the present study effects on gait also has been assessed along with the conventional therapy and the result has revealed that modified sit to stand is effective on gait and balance.

Most of the studies reported in the literature regarding motor imagery practice of upper limb. Johnson (2010) conducted research by using functional MRI on reaching and found that people with right or left hemiparesis, either in an acute or a chronic stage after stroke, can create a representation of the reaching movement of the paretic upper limb in their brain. The study’s conclusion was that people with hemiparesis can activate their partially damaged motor networks by use of motor imagery, which may quicken functional reorganization. It was found that there were fewer studies dealing with motor imagery in the lower limb. Our study was focused on mental practice of lower limb which was found to be beneficial in improving balance and gait in post stroke patients.

A study conducted by Hwi-young Cho et al (2012) concluded that Gait training with motor imagery training improves the balance and gait abilities of chronic stroke patients significantly better than gait training alone. Similar results are obtained in the present study which proved that adding mental practice along with modified sit to stand training had beneficial effects on balance & gait in post stroke patients. The present study further braces the findings of Francine Malouin et.al (2009) who concluded that there is an added value of combining mental repetitions with a small number of physical repetitions to promote the relearning of motor strategies post-stroke.

CONCLUSION

Based on the results of the present study, it can be concluded that modified sit to stand training with mental practice is effective in improving the balance and gait of the patients following stroke rather than the conventional therapy alone.

Limitation of the study: The study had a limited number of stroke patients recruited and no follow up was observed. Hence future studies can be done on larger sample size at multi centres with long term follow up.

Conflict of Interest: There is no conflict of interest.

Source of Funding: Self funded

Ethical Clearance: Obtained

REFERENCES


Factors affecting Recovery after Stroke:
A Narrative Review

Ashish Kakkad1, Priyanshu V Rathod2
1Assistant Professor, SPB College of Physiotherapy, Surat, Gujarat, India
2Guide & Dean, Faculty of Medicine; School of Physiotherapy, RK University, Rajkot

ABSTRACTS

Introduction: Stroke is a global health problem. It is second commonest cause of death and fourth leading cause of disability worldwide. After stroke, recovery is variable in different patients depending upon many factors. Aim: The aim of this narrative review is to examine the available literature related to factors affecting recovery in stroke patients. Methodology: Literature was searched using many electronic databases. Additionally, reference list of most prominent articles were searched to increase the search accuracy, as much as possible. Studies which are evaluating the factors affecting post stroke recovery were included. Results: Results of studies evaluating the effect of different factors affecting recovery in stroke patients are contradictory for few factors. Demographic factors like age, gender, body mass index affect post stroke recovery in different outcomes. Out of these demographic data, age and gender have contradictory finding on post stroke recovery by different studies. Clinical features like side body of involved, duration of coma, duration of hospital stay, type of stroke, family history, and personal addiction history may or may not affect post stroke recovery. Associated co morbidities like hypertension, diabetes etc may have influence on functional outcome after stroke. Conclusion: Many literatures suggest different demographic, clinical, addiction history related factors etc affect post stroke recovery. Significance of this involvement is to become clearer.

Keywords: Factors affecting recovery in stroke, Post stroke recovery, Stroke.

INTRODUCTION

World Health Organization (WHO) defines stroke as a clinical syndrome characterized by rapidly developing clinical symptoms and/or signs of focal and at times global loss of cerebral function, with symptoms lasting more than 24 hours or leading to death, with no apparent cause other than that of vascular origin.1,3

Stroke is classified into two types. Ischemic stroke is the most common type affecting about 67-80% of individuals with stroke1,2 and results when a clot or block impairs blood flow. Hemorrhagic stroke occurs when blood vessels rupture, causing leakage of blood in and around brain. Symptoms may include headache, abnormal vision, any of the symptoms of stroke such as weakness of the face and limbs on the side of the body and seizures.4

Stroke is a global health problem. It is second commonest cause of death and fourth leading cause of disability worldwide.5 In developed countries, stroke is the first leading cause of disability, second leading cause of death.5

The incidence of stroke rises rapidly with increasing age. In India, the overall prevalence rate for stroke lies between 84 – 262 per 100,000 in rural area and between 334 – 424 per 100,000 in urban areas.6 After the age of 55 years, the risk of stroke doubles every 10 years; two thirds of all strokes occurring in people older than the age of 65 years.7 The incidence of stroke is about 1.25 times greater for males than female.8

Author for Correspondence:
Dr. Ashish Kakkad,
Assistant Professor, SPB Physiotherapy College, Ugat Bhesan Road, Surat, Gujarat, India.
Email: kakkadashish@yahoo.co.in
Major risk factors for stroke are hypertension, heart disease, atherosclerosis, diabetes and elevated total blood cholesterol level. Cardiac disorders such as rheumatic heart disease, valvular heart disease, endocarditis, or cardiac surgery increase the risk of embolic stroke. Transient ischemic attack (TIA) is other risk factor for stroke.1 Modifiable risk factors include smoking, obesity, lack of exercise, diet and excess of alcohol consumption and many more as well as non-modifiable risk factors include age, gender, race and family history and many more.8

All above mentioned factors also affect recovery after stroke. In the rehabilitative treatment of stroke patients with hemiplegia, prediction of recovery is very important. Accurate prediction facilitates proper setting goals of intervention for individual patients, thus improving the quality and efficiency of rehabilitation service. For individual patients, health care administrators and for those who are paying for it, accurate prediction of functional recovery would provide crucially important information.9

MATERIAL AND METHOD

The first author searched and assessed literature and second author reviewed and revised manuscript. It was done by comprehensive computerized search on Science direct, National Library of Medicine (Pubmed), Biomed Central, Google Scholar, CINAHL, Pubmed central and Oxford Press. The key words “Factors affecting stroke recovery” were used in combination with following terminologies: predictive model for stroke recovery, factors predicting stroke recovery, factors responsible for post stroke recovery. Additionally, reference lists of most pertinent articles were searched to increase the search accuracy, as much as possible.

By searching databases we found 39 records. Out of these 39 records, 32 records were related to post stroke recovery and 7 records were related to predictive models of stroke recovery. Out of 39 records, 18 records were not connecting different predictive factors affecting post stroke recovery, hence discarded. We assessed remaining 21 full- text articles as shown in Figure 1.

- Researches identified by online database n=39 (Articles related to post stroke recovery n=32 + Articles related to predictive model for stroke recovery n=7)
- Screening was done and 18 full articles were removed.
- Finally total 21 articles were eligible and included in narrative review.

Figure 1: Flow Diagram of Literature Search

Effort is done to include maximum available researches which are evaluating the effect of different pre stroke predictive factors in post stroke recovery.

Does gender affect post stroke recovery?

Gender may affect post stroke recovery. But findings are contradictory. Male have poor outcome after stroke than females.15 Contradictorily, Female patients have greater difficulty than male patients in recovering from a disabled state after acute stroke. Female patients exhibited significant disabilities and handicaps at the 3 months post stroke follow-up.11, 12 Lower recovery of activities of daily living and physical functioning in women after stroke.16

Does side of body involved affect post stroke recovery?

There is negative impact of age on functional outcome is most apparent when it is checked at discharge. The association between increasing age and poor outcome can be explained by patient characteristics associated with age, such as additional disabilities or co morbidities. Older age was associated with greater risk of poor functional outcome at 3 months.10, 11, 12, 13 A negative association was observed between patients’ age and functional gain after rehabilitation treatment.14
Clinical features are found different in left or right side of brain damage but hemisphere of stroke does not predict outcome. Does dominancy of body affect post stroke recovery?

Effect of paralysis is not significantly affecting Quality of life depending upon dominant or non-dominant hand affected in subacute stroke patients Does type of stroke affect post stroke recovery?

No significant difference between post stroke recovery after ischemic versus hemorrhagic stroke. Whether the stroke was caused by hemorrhage or an infarct had no influence on the prognosis of the stroke patient per se.

Does coma affect post stroke recovery?

The longer a patient remains in a coma the poorer his or her chance of recovery after stroke. Within six hours of coma onset those patients who show eye opening have almost a one in five chances of achieving a good recovery whereas those who do not have a one in 10 chances.

Does length of stay in hospital affect post stroke recovery?

Length of stay in hospital is also considered predictive factors which are decided by functional status at the time of admission in hospital and it shows time taken for vitals to be stable.

Does Body Mass Index (BMI) affect post stroke recovery?

Chronic stroke patient with higher BMI were less likely to demonstrate improvement in motor impairment and “up and go” functional mobility performance in response to ambulation training, irrespective of treatment intervention. Pre treatment BMI is significantly negatively associated with change in motor impairment measure by Fugl-Meyer Score.

Does family history affect post stroke recovery?

A positive family history of stroke among a first degree relative was related to ischemic stroke subtype and also to functional status at discharge. More research is needed to understand about a possible genetic link to recovery following ischemic stroke.

Does smoking affect post stroke recovery?

921 patients ceased smoking while in the hospital and declared themselves motivated to continue abstaining once they were discharged. Within a year 89 patients died, which equates to a one-year probability of death of 9.6%. But effect of smoking on post stroke recovery is not clear.

Does alcohol consumption affect post stroke recovery?

No strong association between alcohol consumption and functional outcome of stroke. On the contrary, modest beneficial association exist between alcohol consumption.

Does smokeless tobacco affect post stroke recovery?

Further long term studies are required to prove effect of smokeless tobacco in stroke recovery.

Does history of Transient Ischemic Attack affect post stroke recovery?

In patients with neurological deficits, poor outcome was experienced at discharge, at 3 months and 1 year after stroke. Previous history of stoke was also significant predictor of poor functional outcome at 3 months and 1 year.

Does diabetes affect post stroke recovery?

Diabetes increases poststroke mortality and adversely affects poststroke outcomes as compared with stroke patients without diabetes. Diabetes was significant predictor of poor functional outcome at 3 months and 1 year.

Does hypertension affect post stroke recovery?

Effect of hypertension is associated poor clinical outcomes after stroke. The higher post stroke blood pressure levels are significantly associated with lower probability of a good neurological recovery and elevated risk of neurological deterioration and a poor functional outcome as adjusting potential confounding factors.

Does co-morbidities affect post stroke recovery?

Cardiac co-morbidities (arterial hypertension, myocardial infarction, atrial fibrillation, and dilated cardiomyopathy) show significant clinical relevance and have strong influence on rehabilitation outcome.
Does post stroke duration affect post stroke recovery?

Motor recovery comes in first month after stroke. Later also it continues up to 6 months after stroke. But it is difficult to give precise time window for motor recovery in individual patients. No attempt has been made to summarize and integrate the findings of the most valid studies and to provide a quantitative summary estimate of post stroke motor recovery.19

Do radiological findings affect post stroke recovery?

No significant correlation between initial lesion size in MRI and recovery. The determination of size and location of the cerebral lesion by means of neuroimaging techniques did not add much information to predictions based on clinical data alone.18, 19

Do all these factors impact of outcome on society?

Sanchez Blanco et al in 1999 in “Predictive model of functional independence in stroke patients admitted to a rehabilitation programme” mentioned in the study that prediction about recovery in stroke will be helpful to establish realistic goals, to facilitate proper future planning as well as to anticipate need for home adjustment and community support.17 Abdel D., et al. in 2017 published in “Patient specific prediction of functional recovery after stroke” and explained that prediction is recovery is helpful in decision making for effective delivery of preventive and therapeutic intervention of stroke.28

DISCUSSION

The purpose of this article was to review and evaluate the existing scientific literature for predictive factors affecting post stroke recovery.

Stephen Bagg et al. in 2017 explained it is difficult to distinguish between age itself and such age-related factors as co-morbidities (ischemic heart disease, hypertension, diabetes, altered cognitive capacity) that negatively affect functional outcome. Other factors such as cognitive status, lack of supportive caregiver have a significant impact on discharge disposition after rehabilitation.9 Ji Sun Kim et al in 2010 explained that females were diagnosed with major depression after stroke twice as frequently as males. Post stroke depression may delay recovery. Limitation in this study was that there was no much information about caregivers, economic status, educational level or family support after discharge which can influence outcome.14 Dr. David Bates in 2001 by extensive review of literature identified four clinical features those help to determine prognosis i.e. etiology, depth of coma, duration of coma and clinical signs. No clinical sign alone was predictor of outcome after stroke but it was combination of different signs may potentially improve efficacy of prognosis.18

Effect of Body Mass Index on post stroke recovery is also supported by Kalichman et al by finding a negative correlation between Body Mass Index and relative improvement of Functional Independence Measure score at the end of 12-week period of inpatient acute stroke rehabilitation.29

Mohmoud E. Nazzal et al found that gender, race and side of hemisphere does not affect post stroke recovery but co-morbidities such as Diabetes, Hypertension and Ischemic Heart Disease has been associated with poorer outcome.15 In contrast, Koji Ishitsuka et al in their study found that high post stroke blood pressure was favorable in outcome.27 I Sanchez-Blanco et al found that size and location of the cerebral lesion by radiography did not add much information for prediction of post stroke recovery. Literature is limited to predict post stroke recovery based on family history and addiction (tobacco, alcohol and smoking) history of patients.18 Henk T. Hendricks et al found that overall improvement in motor functions occurred within first month after stroke although some degree of motor recovery continued in some patients up to 6 months and late recovery may occur even several months after stroke.19

So far there is no gold standard available for prognosis for stroke recovery. Different clinical and laboratory methods are used for diagnosing stroke but for prognosis, there are few models or tools which can be considered as reliable method. All of them evaluated the post stroke recovery related to the different aspects of different factors. Some of these factors are present before stroke and affecting post stroke recovery. Few clinical and laboratory findings are also affecting post stroke recovery. Early accurate prediction of outcome will be helpful to establish realistic goals, to facilitate proper discharge policy, and need of home adjustment and social support.17 For example, Henk T. Henrich et al. in 2012 concluded that prognostic accuracy of Motor Evoked Potential appears much higher than that of clinical examination for different subgroups of patients.19

CONCLUSION

Most of the literatures reviewed here suggest that
many pre stroke demographic as well as clinical factors and other factors also affect post stroke recovery. However, the significance of this review of literature is an effort to become clearer.

**Conflict of Interest:** None

**Funding:** None

**Ethical Clearance:** Not required as narrative review

Cite this Article as: Kakkad A D, Rathod P V. Factors affecting recovery after stroke: A Narrative Review

**REFERENCES**


Comparission between Effectiveness of Lumbar Stabilization Exercises and Conventional Physical Therapy in the Management of Mechanical Low Back Pain

Namrata Srivastav¹, Sneha Joshi², Saurav Singh Kushwah¹

¹Assistant Professor, ²HOD, Career College, Department of Physiotherapy, Bhopal

ABSTRACT

Objective: This study is aimed to find out the effectiveness of Lumbar Stabilization Exercise along with the conventional physical therapy in the management of Mechanical Low Back Pain.

Study design: Experimental study design was adopted for the study

Subjects: 30 patients between age of 30-50 yrs having significant Mechanical Low Back Pain were selected as per the inclusion and exclusion criterion.

Procedure: Using random sampling method the 30 subjects were divided into 2 equal groups with 15 patients. Both the groups were given conventional physical therapy as a baseline treatment. Along with conventional therapy the experimental group received Lumbar Stabilization Exercise 5 days per week for 6 weeks, whereas control group received only the conventional physical therapy. The study was performed for 6 weeks. Evaluation was done before starting the treatment and then after 6 weeks. Outcomes were evaluated using NPRS, MODQ

Result: After a 6 week training period the Lumbar stabilization group scored significantly higher than the conventional group for NPRS (p<0.05) and MODQ (p<0.05).

Conclusion: After the treatment sessions Lumbar stabilization group registered a significant improvement when compared to conventional physical therapy in improving function and in relieving pain.

Keywords: Lumbar Stabilization, Mechanical low back pain, MODQ, NPRS

INTRODUCTION

Mechanical low back pain is defined as pain resulting from inherent susceptibility of the spine to static loads due to muscle and gravitational forces and to kinetic deviation from normal function.¹

Characteristics of Mechanical low back pain includes unilateral or bilateral involvement & non-dermatomal origin with no sensory and neurological involvement. Pain is mechanical in nature which means it varies with the physical activities, wrong/static posture over extended period of time. Prognosis of mechanical pain is good with 90% recovery from acute attack within 6 weeks.

Lumbar lordosis is thus an important element in both static and dynamic physiology. An increase, a reduction or altered distribution of this spinal curve inevitably changes the functionality of the spine and can promote the occurrence of subsequent mechanical stress, mostly at the disc level thus causing mechanical low back pain.⁹

Ligaments & muscles provide structural stability to the spine. Ligaments are passive elastic structures that prevent excessive motion. Muscles are also important spinal stabilizers because they position and stabilize the
spine during awkward postures and provide power for lifting and carrying.

The human back is composed of a complex structure of muscles, ligaments, tendons, disks and bones - the segments of our spine are cushioned with cartilage-like pads. Problems with any of these components can lead to back pain. The most common causes of back pain are: Strain - Lifting something in an improper manner is a common cause of back pain. Strained muscles, Strained ligaments, Lifting something improperly, Lifting something that is too heavy The result of an abrupt and awkward movement, Back pain can also be the result of some everyday activity or poor posture. Examples include:

- We live in a world of computers. Adopting a very hunched sitting position when using computers can result in increased back and shoulder problems over time, Bending awkwardly, Pushing something, Pulling something, Carrying something, Lifting something, Standing for long periods, Bending down for long periods, Twisting, Coughing, Sneezing, Muscle tension, Over-stretching, Sitting in a hunched position for long periods (e.g. when driving), Long driving sessions without a break (even when not hunched), A mentally stressful job, Pregnancy - pregnant women are much more likely to get back pain, A sedentary lifestyle, Age - older adults are more susceptible than young adults or children, Anxiety, Depression

There is ample evidence that active approaches to the rehabilitation of patients with sub-acute and chronic low back pain (LBP) are beneficial.(1,2) Exercise therapy, as an approach that engages patients in activity, can be useful after the acute stage of LBP; however, positive results have been documented with different types of exercise utilized by physical therapists, Exercise programmes that aim to improve the “stability” of the lumbar spine are widely utilized in the management of patients with low back pain (LBP). Current research has reported that in most cases of LBP, certain muscles of the back that stabilize the spine are reflexively inhibited (shutdown) after injury. These muscles do not spontaneously recover even if patients are pain free with a return to normal activity levels. These specific muscles work together to support and stabilize the spine to help prevent LBP. These muscles include the lumbar multifidi and the transversus abdominis:

**METHODOLOGY**

**Study Design:** Experimental Design

**Sampling:** Random Sampling

**Sample:** 30 mechanical low back pain patients, 30-50 years of age volunteered to participate in the study. They were randomly divided into 2 groups; Group A (Experimental) and Group B (Control) with each group having 15 patients.

**Study Centre:** Career Institute of Medical Sciences

**SUBJECT SELECTION CRITERIA**

**Inclusion Criteria**

Each patient had the diagnosis of mechanical lower back pain for more than three months and failed to respond to maximum medical treatment.

1. Both males and females patients.

2. Screened positive in diagnostic tests (soreness test, lax muscle test, movement impaired test, prone instability Test)

**Exclusion Criteria**

1. Subjects with neurological deficit & sensory involvement.

2. Subjects with Spondylolisthesis, RA, Ankylosing Spondylitis and any previous vertebral surgeries.


4. Previous history of trauma around lumbar and sacral region.

5. Pregnancy.

6. Subjects taking analgesics and/or muscle relaxants.

7. Patients with cognitive deficits.

**Procedure:**

Aim of the study and procedure were explained to all the patients and informed consent was taken. After baseline measurements subjects were randomly divided into 2 groups.
Experimental A Group –

Subjects received Ultra Reiz program followed by Lumbar Stabilization Exercises of muscles involved in MLBP. This was followed by muscles stretching and strengthening exercise.

Control B Group –

Subjects received Ultra Reiz program followed by muscle stretching and strengthening exercise only. Lumbar Stabilization Exercises was not given.

Method of application of treatment:

a) ULTRA REIZ PROGRAM-

Subjects received Ultra Reiz low frequency rectangular galvanic type of continous mode pulse width of 2 ms and pulse rate -143hz. Subjects received ULTRA REIZ current followed by muscle stretching and strengthening exercise only.

ULTRA REIZ current :

<table>
<thead>
<tr>
<th>Pulse width on time</th>
<th>2 m sec</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulse width off time</td>
<td>7 m sec</td>
</tr>
<tr>
<td>Frequency</td>
<td>143 Hz</td>
</tr>
</tbody>
</table>

Method of application of treatment:

Electrode placement- Two pad electrodes placed left and right side ,posteriorly over the lower back. moist cloth (LINT –PAD) emersed in water used as a mediator.

Treatment session: Ultra Reiz was given for 15 minutes for 5 days per week for a period of 6 week intervention.

b) Lumbar stabilization program :

The first consideration before establishing phases of treatment is to determine testing procedures. Many experimental assessment procedures, some of them described above, give essential information about joint protection mechanisms, especially in the lumbopelvic region.

The segmental approach we have devised develops through three stages of segmental control, with each stage exposing the individual patient to increasing challenges to his/her joint protection mechanisms (Richardson et al., 2004).

Segmental control over primary stabilizers (mainly TrA, deep multifidus, pelvic floor and diaphragm)

Exercises in closed chain, with low velocity and low load

Exercises in open chain, with high velocity and load

Phase 1

Key: Segmental control over primary stabilizers.

We refer to re-establishing directly the simultaneous contraction of the deep muscle synergy independently of the secondary stabilizers and mobilizers. This simultaneous contraction of the synergy, independent of the global muscles, should occur with the postural cue to “draw in the abdominal wall”. The weight of the body is minimized in order to allow the patient to focus on this specific skill involved in joint protection.

The precise position of the lumbopelvic region may itself be facilitatory for activation of the local synergy muscles. Recent research has shown that better co-activation of the TrA occurs when the pelvic floor is contracted with the lumbar spine place in a more neutral position (Sapsford et al., 1997b). There is a consensus that local muscles are involved in segmental support and, therefore, contribute to the precise positioning of the lumbosacral curve.

Phase 2

Key: Exercises in closed chain, low velocity and low load.

The purpose is to maintain local muscle synergy contraction, while gradually progressing load cues through the body using weight bearing closed chain exercises. Weight bearing load is added very slowly, ensuring any weight bearing muscle at any kinetic chain segment is activated in order to give effective antigravity support and provide efficient and safe load transfer through the segments of the body. The focus is especially to ensure activation of the local and weight bearing muscles of the lumbar spine and pelvis, and the ability to maintain a static lumbopelvic posture for weight bearing. These muscles are likely to be dysfunctional in patients with low back pain. In addition, lifestyle
factors of many individuals, which could have led to a dysfunction in these muscles, need to be addressed, as they may place them at risk of sustaining further low back injury.

**Phase 3**

Key: Exercises in open chain, high velocity and high load.

The aim is to continue to maintain local segmental control while load is added through open kinetic chain movement of adjacent segments. This final step is to direct progression so that all muscles are integrated into functional movement tasks in a formal way. This third stage allows any loss of local segmental control during high loaded open chain tasks to be detected, as well as ensuring that there is no compensation by the more active (i.e. non-weight bearing) muscles. In addition, loss of range of asymmetry of joints adjacent to the lumbopelvic region needs to be addressed to ensure that loss of movement range does not interfere with the ability of the individual to maintain lumbopelvic stability during movement.

**Treatment session:**

A series of 10 strengthening per session and hold for 10 seconds is given for 5 days per week for a period of 6 week intervention.

**Strengthening Exercises:**

Strengthening of Back and Leg Muscles: Treatment was given for a series of 10 repetition per session and hold for 10 seconds is given for 5 days per week for a period of 6 week intervention.

**Outcome measures:**

The 3 outcome measures used in this study are:

1 NPRS Scale

2 Modified Oswestry Low Back Pain Disability Questionnaire

**STATISTICAL ANALYSIS**

Analysis of data collected with NPRS, MODQ and MMT of 30 subjects. Suitable statistical analysis test was used in order to verify the investigation of the study. Statistics was performed using the software package SPSS 17.0. The characteristics of the data are predicted through tables. Pre and post test scores of NPRS, MODQ and MMT were analyzed using paired t-test within the group. Independent t-test was used to find out any significant difference between groups A and B. Significant level was defined at $P < 0.05$.

**RESULTS**

**Table-1: Comparison between pre nprs scores of experimental Group (A) and control Group (B) and post nprs scores of experimental Group (A) and control Group (B)**

<table>
<thead>
<tr>
<th>Unpaired T Test</th>
<th>NPRS</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>PRE</td>
<td>POST</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group A</td>
<td>Group B</td>
<td>Group A</td>
<td>Group B</td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>6.80</td>
<td>6.87</td>
<td>0.80</td>
<td>1.27</td>
</tr>
<tr>
<td>S.D.</td>
<td>1.146</td>
<td>1.187</td>
<td>0.862</td>
<td>0.961</td>
</tr>
<tr>
<td>Unpaired T Test</td>
<td>0.156</td>
<td>1.400</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P value</td>
<td>0.8768</td>
<td>0.0000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Table Value at 0.05 df 28</td>
<td>2.05</td>
<td>2.05</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Result</td>
<td>Not-Significant</td>
<td>Significant</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table-2: Comparison between pre modq scores of experimental Group (A) and control Group (B) and post modq scores of experimental Group (A) and control Group (B)**

<table>
<thead>
<tr>
<th>Unpaired T Test</th>
<th>MODQ</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>PRE</td>
<td>POST</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group A</td>
<td>Group B</td>
<td>Group A</td>
<td>Group B</td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>30.00</td>
<td>32.90</td>
<td>4.69</td>
<td>20.49</td>
</tr>
<tr>
<td>S.D.</td>
<td>4.408</td>
<td>4.870</td>
<td>2.890</td>
<td>4.701</td>
</tr>
<tr>
<td>Unpaired T Test</td>
<td>1.710</td>
<td>11.085</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P value</td>
<td>0.0984</td>
<td>0.0000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Table Value at 0.05 df 28</td>
<td>2.05</td>
<td>2.05</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Result</td>
<td>Not-Significant</td>
<td>Significant</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**DISCUSSION**

The research hypothesis was proved that Lumbar Stabilization Exercises along with conventional therapy is more effective than conventional therapy alone. The patients selected in this study were between the ages of...
30 to 50 years and had repetitive tasks and sedentary lifestyle with muscle weakness, tightness and imbalance which produced gradual onset of regional pain and postural dysfunction like increased lumbar lordosis, weak AB’s.

In this study we observe the effectiveness of Lumbar Stabilization Exercises on patients of MLBP. Documentation of the research indicates the use of exercises alone can be moderately successful in correcting this syndrome. The addition of Lumbar Stabilization Exercises to form this new protocol of treatment hypothesizes to increase the effectiveness of the results as well as decrease the time to achieve those results. The outcomes of patients will determine the efficacy of the protocol. Our findings demonstrate that a 6 week treatment protocol with a frequency of 5 session per week to reduce pain and muscle tightness, weakness and musculoskeletal complaints in people with MLBP. The research suggests that spinal instability caused by significant decrease in the capacity of the stabilizing system of the spine to maintain the intervertebral neutral zones within the physiological limits so that there is no neurological dysfunction, no major deformity, and no incapacitating pain. (Panjabi, 1992b), therefore an unstable spinal segment might not be able to maintain the correct vertebral alignment. The excessive movement in an unstable spine may either stretch or compress pain sensitive structures, leading to inflammation (Panjabi, 1992a).

Waddle et al, 1997 proposed that Lumbar stabilization model is an active approach to low back pain. Based on a motor control exercises program is to re-establish the impairment or deficit in motor control around the neutral zone of the spinal motion segment by restoring the normal function of the local stabilizer muscles. Stabilization exercises thus to improve these muscle activation patterns, thereby diminishing both incapacity and lumbar pain through improvements in trunk muscle contraction. (2, 15) Trunk stabilization exercises are based on co-contraction of the abdominal and multifidus muscles, and they are performed in a variety of body positions as little as 10% can compromise the stability of the spine. They concluded that factors such as pathologic reduction in motion segment stiffness, as well as poor neuromuscular control of the spinal musculature and reduction of muscle stiffness, could result in a state of spinal instability. Consistent with these findings, Cholewicke and McGill, 1992 reported that lumbar stability is maintained in vivo by increasing the activity (stiffness) of the lumbar segmental muscles, and highlighted the importance of motor control to coordinate muscle recruitment between large trunk muscles and small intrinsic muscles during functional activities, to ensure stability is maintained. Muscular reeducation therapies provided significant relief to patients with MLBP. The research shows a decrease in pain symptoms and improved muscular balance with exercise and stretching and the use ULTRA REIZ. This is the standard protocol with most health professions dealing with Mechanical Low Back Pain. Training local segmental control involves activating and facilitating the local muscle system, while using techniques (e.g. feedback) to reduce the contribution of the global muscles, most particularly the mobilizers. Instructional cues, body position and various feedback techniques are used simultaneously to facilitate the local synergy and inhibit or relax the more active global muscles. The ability to hold this pattern through developing specific muscular control, without addition of any load, may serve also to help to restore kinaesthetic awareness and lumbopelvic position sense, usually found to be impaired in the patient with low back pain.

**CONCLUSION**

The effect of Lumbar Stabilization Exercises along with conventional therapy for a period of 6 weeks resulted in significant improvement in MLBP as shown by the scores of NPRS, MODQ.

**Conflict of Interest/ Source of Funding-** Nil

**Ethical Clearence:** We certify that this study involving human subjects is in accordance with the regulations stated by ethical committee.

**REFERENCES**


Comparison of Knee Rotations in Asymptomatic & Osteoarthrosis Patients

Pallavi D Chopade¹, Payal Jain-Patni², Vasudha Gholap²
Assistant Professor, ¹Ex-Staff CMF College of Physiotherapy, Pune

ABSTRACT

Purpose of study: Altered biomechanics of knee due to ageing & osteoarthrosis may affect ROM of knee rotations. Aim: 1) To compare ROM of knee rotations in asymptomatic subjects & patients with knee osteoarthrosis. 2) To find out co-relation between knee rotations & knee outcome survey score. Methodology: Study design: Cross-Sectional study Sample: 50 Study Setting: Physiotherapy department, Pravara rural hospital, Loni Inclusion Criteria: – Age 50-70 yrs. Gender both males & females Group A – asymptomatic subjects without any low back, hip, knee & ankle pain. Group B – diagnosed osteoarthrosis patients stage III on Kellgren and Lawrence scale Exclusion Criteria: Patient with history of fall and blunt trauma over Back, lower limbs. Patient with chronic and acute low back pain. History of any surgery of lower limb. Patient with any knee joint pathology like osteomyelitis, chondromalacia patellae, bone tumour. Result: Statistical analysis was done using Unrelated ‘t’ test which showed significant difference (p<0.05) between medial rotation symptomatic/asymptomatic subjects. There is significant co-relation (p<0.05 & r=0.7) between ROM of medial rotation & KOS score, with decrease in medial rotation, KOS score decreases. Conclusion: Medial rotation decreases in osteoarthrosis knee patients as compared to Asymptomatic subjects. Reduced medial rotation causes increase in disability.

Keywords: Medial rotation of knee, knee disability survey score, osteoarthrosis knee.

INTRODUCTION

Knee joint plays important role in supporting the body during dynamic as well as static activities like sitting, squatting, and transferring the body weight during locomotion activities.

Knee joint has 3⁰ of freedom i.e. flexion – extension, rotations and varus / valgus motions. In all these movements rotations are very important because they are associated with the locking and unlocking mechanism of knee joint. Unlocking and locking takes place during sitting, squatting, stair climbing ascending – descending. Unlocking is associated with medial rotation and locking is associated with the lateral rotation of tibia. When the knee joint close pack position, all the ligaments are taut and tibial tubercles are lodged in the inter-condylar notch and menisci are tightly interposed between the articulating surface. This is locking of the knee joint in locked position knee goes under lateral rotation as knee flexes to 30⁰ means it goes into unlocking position, it goes to medial rotation of tibia on femur before flexion can proceed.

Studies reports that knee excursion during gait range from almost complete extension. Approximately 1⁰ in midstance to 65⁰-70⁰ in midswing. However, many common activities of daily living require knee flexion i.e. stair ascent and descent use between 90⁰ to 110⁰ of flexion rising from chair requires approximately 130⁰ and squatting upto 165⁰. In the Indian setup these activities are important.

In osteoarthritis of knee in stage (III) degenerative changes already present, osteophytes are formed, there is medial joint space narrowing and medial compartment gets involved and joint starts to go varus deformity because of this medial weight bearing is more, this allows more varus forces to act on the joint and it allows...
Abnormal joint mobility is an important factor in movement dysfunction and physical disability. Because the decision to treat impaired joint mobility in an older individual may be influenced by assumptions concerning normal range of motion (ROM) at older ages, it is important to establish population-based normative values for hip and knee ROM by age, race, and sex and pathologies like osteoarthrosis may alter these ranges.\(^5\)

Need of the study is to first measure the normal ROM of medial and lateral rotation in 50 – 70 years age group individuals and compare with knee osteoarthrosis patients. By comparing it rotation exercises of knee and strengthening exercises of those muscles which prevent further loss of ROM of rotation can be one of the significant recommendation in the rehabilitation of patients with osteoarthrosis.

**OBJECTIVES**

1) To compare ROM of knee rotations in asymptomatic subjects & patients with knee osteoarthrosis.

2) To find out co-relation between knee rotations & knee outcome survey score.

**MATERIALS AND METHODOLOGY**

**Methodology:** It was a cross-sectional study carried out at Physiotherapy out-patient department Loni during one year period. 50 Participants included in the study in the age group of 50-70 years. Both males and females were included. They were randomly allocated to two groups. Group A consisted 25 asymptomatic subjects & Group B consisted 25 subjects diagnosed with stage III osteoarthrosis on Kellegren and Lawrence scale\(^4\). Patient with history of fall and blunt trauma over back, bilateral lower limbs, patient with chronic and acute low back pain, pathology knee joint osteomyelitis chondromalaia patellae, bone tumor, fracture of lower limb spine, patient with neurological involvement and muscle disorder, stroke etc, knee synovitis and aspiration, rheumatoid arthritis were excluded from the study. Measuring Scale, Protractor, Pencils, Drawing paper were used for the measurement of knee rotations. Knee outcome survey scale was used for the disability measurement.\(^4\)

**Procedure:**

Instructions given to subject 1) Sit straight. 2) Don’t move your leg actively. 3) Don’t lean forward or backward. 4) Knee should maintain exactly above the ankle.

Subject is made to sit in chair with hip and knee flexed at 90\(^o\). Subject’s back should be supported with back rest and measurement should be taken with flat footwear on. The following landmarks were first marked on the sole of footwear i) Head of metatarsal of big toe. ii) Head of metatarsal of little toe. iii) Medial malleolus. iv) Lateral malleolus. The foot of subject (with flat footwear on) was placed on the paper and outline of footwear was drawn. The impression of bony landmarks was drawn on that outline. The leg was passively placed medially (in available ROM) and outline of footwear and impression of bony landmarks was marked again. After that, the leg was laterally rotated and markings were done and the paper was removed. Later the opposite markings of head of metatarsals of big toe and little toe were joined and same way was joined another impressions of malleoli. The midpoint of each line was taken and that 2 midpoints were joined and axis of the foot was drawn, same way axis of laterally and medially rotated foot were obtained and angles between two axis were coincided i.e. Neutral and post rotational axis.\(^2\)
3. Lateral Rotation

4. Axis of rotation

STATISTICAL ANALYSIS AND RESULTS

‘SPSS’ (version 16) software as used for analysis. Unpaired ‘t’ test was used to test difference in medial & lateral rotations between Group A & Group B. Pearson’s coefficient of co-relation was used to test co-relation between the knee rotations & disability (KOS )score. The results were considered significant if confidence interval was 95%.

Graph 1 – shows the medial rotation in Osteoarthrosis patients is reduced than lateral rotation when compared to asymptomatic subjects

Table 1- There is significant reduction in medial rotation between two groups.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Medial rotation</th>
<th>Lateral rotation</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>22.84°±1°</td>
<td>30.56°±0.5°</td>
</tr>
<tr>
<td>B</td>
<td>26.6°±0.3°</td>
<td>30.58°±1</td>
</tr>
</tbody>
</table>

‘p’ value  
p<0.05  
p>0.05

Graph 2 shows co-relation between ROM of medial rotation & KOS score, with decrease in medial rotation, KOS score decreases.

Table 2- There is significant co-relation between medial rotation and KOS score

| ‘r’ value | 0.7 |
| ‘t’ value | 2.39 |
| ‘p’ value | <0.05 |

Graph 3- shows-co-relation between lateral rotation and KOS score, increase in Lateral Rotation, Decrease in KOS scores i.e. more Disability.
Table 3- There is no significant co-relation between lateral rotation and KOS score.

<table>
<thead>
<tr>
<th>'r' value</th>
<th>0.07</th>
</tr>
</thead>
<tbody>
<tr>
<td>'t' value</td>
<td>0.72</td>
</tr>
<tr>
<td>'p' value</td>
<td>&gt;0.05</td>
</tr>
</tbody>
</table>

DISCUSSION

Average age of both groups was similar. Rotations was measured in 90° of knee flexion because maximum range of axial rotation is available at 90° of knee flexion. Normal ROM of medial rotation is 0°-30° & that of lateral rotation is 0°-40°. Highly significant (p<0.05) difference was observed between ROM of medial rotation of asymptomatic subjects & patients with osteoarthrosis ((Table 1). Medial rotation was reduced in osteoarthrosis patients as compared to asymptomatic subjects of similar age group. Reduction in medial rotation in osteoarthrosis patients is due to formation of osteophytes, narrowing of medial joint space increased medial joint forces (varus deformity). In subjects without any knee pathology, in resting position, tibial plateau & femoral condyle are parallel hence axis of rotation of distal femur & proximal tibia is aligned so that angle of version is 0° & in patients with osteoarthrosis of knee angle of version becomes 5°, therefore tibia remains in lateral rotation position. The screw home mechanism occurs only if the tibia is initially medially rotated in flexion before the knee is extended, if the tibia is externally rotated medial tibial rotation will occur with extension. Also there was significant (p < 0.05) co-relation between medial rotation & disability score (knee outcome survey score) (Table 2). Increased disability was associated with reduced medial rotation. This is may be due to altered unlocking mechanism.

It is concluded that the medial rotation of knee reduces in osteoarthrosis patients as compared to asymptomatic subjects. Loss of medial rotation is responsible for increased disability in osteoarthrosis patients. The study was conducted on small sample size and other stages of osteoarthrosis were not considered. Further the study can be carried out on large population, knee rotations can be checked in various knee flexion positions, co-relation of rotations can be done with hamstring tightness, quadriceps angle and tibiofemoral angle.

For osteoarthrosis patients ‘motion is lotion’ hence, loss of medial rotation ranges should be prevented in the treatment to alleviate further damage to the knee joint. This can be done by emphasizing on strengthening of Medial rotators (Guy ropes, semimembranosus), or Stretching of Lateral rotators (Biceps Femoris, tensor fascia latae) of knee.

Conflict of Interest: No

Source of Funding: Self

Ethical Clearance: The procedures followed were in accordance with the ethical standards of the institutional committee.

REFERENCES

5) Roach KE, Miles TP, Normal hip and knee active ROM the relationship to age. 1991
11) Soudan, K., and Auderkercke, R.V.: Methods, difficulties and inaccuracies in the study of human joint mechanics and pathomechanics by the instant axis concept. Biomech. 12; 22 1979


**Functional Balance & Gait Balance in Normal Geriatric Population: By Gait Training with Multiple Task**

Anwesh Pradhan¹, Rishi Raj², Gargi Ray Chaudhuri³, Shabnam Agarwal¹, Tanusree Basak¹

¹Associate Professor, ²PG Student, ³Professor, Nopany Institute of Healthcare Studies, Kolkata, India

**ABSTRACT**

The main impact of pathologies in geriatric population is falling due to abnormal gait deviations. Thus, fear of falling reduces their mobility that prevents independent living in geriatrics. Mobility depends on person’s ability and perception to complete a task. Multiple task training is an interaction of motor and somatosensory inputs. Improvement of gait in geriatrics depends upon the type of task and environment, potentially due to cognitive dysfunction and reduced cognitive performance.

**Purpose of this study:** Geriatric persons were trained with multiple task activity and mental tasking which may help them to improve their gait balance in the altered environment and eventually improve their gait task and reduced chances of fall.

**Materials and Method:** 40 normal geriatric individuals were taken in 2 groups. One group was trained with multiple task exercise while the other was trained with the same and cognitive task for the period of 4 weeks. Gait balance is measured by Berg balance score and Time up and go test.

**Results:** The independent t-test shows significant (p<0.05) difference between groups and the mean comparison shows multiple tasking with cognitive tasking has a better impact in improving gait balance in geriatric population.

**Conclusion:** Multiple tasks exercises with cognitive task can be used as a better tool to improve the gait balance than the multiple task exercises.

**Keywords:** Fall, Gait balance, Multiple task exercise, Cognitive tasking

**INTRODUCTION**

A gradual but definite reduction in physiological capacity of different systems is observed in the process of aging, which leads to decrease in functional capacity of elderly and chronic disability.¹⁻² Established Populations for Epidemiologic Studies of the Elderly (EPESE) indicated the physical disability is most prevalent in oldest-old based on linear relationship between disability and age.³

In elderly, 30% of people who are 65 years old are prone to fall about once a year.⁴⁻⁵ Falling is an interaction of physical dysfunction, medications and environmental hazards that leads to over-balancing and gait impairments. Patla and Shumway-Cook describes Functional gait in eight environmental dimensions like time constraints, distance, ambient conditions, terrain characteristics, external physical load, attention demand, postural transitions and traffic.⁶⁻⁷ Improvement of gait in geriatric population can be considered to make a person walk with a functional speed. It is evident that inability to perform concurrent tasks based on the gait dimensions is a contributing factor to instability and falls in older

**Corresponding author:**

Anwesh Pradhan
Associate Professor, Neuro Physiotherapy Department
Nopany Institute of Healthcare Studies, 2C Nando Mullick Lane, Kolkata, India, Pin-700006
Mobile: +91 9932874589
Email: anwesh0907@gmail.com
adults. In this context it has been suggested that gait training under multiple task conditions are necessary to optimize functional independence and reduce falls in elderly people.\(^8,9,10\)

Multiple task training is an interaction of motor and somatosensory inputs. In multiple tasks such as narrow walking and obstacle walking, participants either stop their walking or take a longer time to complete their gait task due to loss of central capacity to carry out walking and maintain their balance simultaneously. Improvement of gait balance in geriatric population depends upon the type of task and environment, potentially due to cognitive dysfunction or because of reduced cognitive performance.\(^11\)

Multiple task intervention is guided by pathology that underlies the gait deficit, helps to improve functional gait. In multiple task training, the visual attention task and mental task interferes with attention or postural control.

In India the size of the elderly population is fast growing. United Nations (1996 Revision) has indicated that 21% of the Indian population will be 60 plus by 2016.\(^12\) NSS Survey on Employment-Unemployment (2007-2008) revealed that nearly 40% of the persons aged 60 years are working.\(^13\) In rural areas 66% of elderly rural men & above 23% of elderly rural women still participating in economic activity, than in urban area whereas only 39% of elderly men above 7% of elderly women participating in economic activity.\(^14\) So, improving their gait balance may help in improving the quality of life of geriatric population and the society as well both economically and socially.

Thus the purpose of this study is to find out the effects of gait training under multiple task conditions to improve functional balance and gait balance in normal geriatric population.

**MATERIALS AND METHOD**

Participants included were community dwellers of Kolkata of both genders, aged between 65-75 years, able to walk approximately 4 meters without any assistance. Institutional Human Ethics committee approved informed written consent was taken from the willing participants and then were randomly divided in 2 treatment groups (Group A & B). Both groups participants were practiced narrow walking and obstacle walking, additionally group B participants were given mental tasking to do along. All participants underwent 4 weeks training, 3 days per week, 45 minutes per session. Cardiovascular monitoring was done before and after the interventions for all the participants.\(^15,16,17\)

**Narrow Walking:** Participants were asked to walk within 2 parallel strips marking on the floor of 4 meters distance. The width of the strips was determined by 4 cm less than their preferred step-width.

**Obstacle Walking:** Participants were asked to walk and step over 3 obstacles (a shoe box: 10cm high X 19cm wide X 33cm long), placed at starting, 2 meter mark and 4 meter mark in a stretch of 4 meter distance.

**Mental Tasking:** Participants were asked to walk (Narrow and obstacle walking), counting backward by threes from any starting number from 90 to 200 simultaneously.\(^18\)

**Outcome Measures:** Demographic information was collected from all participants in pre-designed format. Berg Balance Scale (BBS) and Time up and go test (TUG) were performed to measure the functional balance and gait balance of the participants respectively. Both the measures are valid and reliable.\(^19, 20, 21, 22\) All the participants were undergone a practice trial before testing.

**RESULTS**

Total 65 participants were screened based on inclusion and exclusion criteria. Out of which 46 were selected and 40 participants had given consent. Demographic data is given in Table 1. There was no drop out. BBS and TUG scores were taken before training started and after 4 weeks of training. Paired t test was used to compare the pre and post training scores in each group which shows significant (p<0.05) improvement in functional and gait balance in the geriatric people Table 2. Independent t test was used to compare the pre-post mean difference between groups which shows significant (p<0.05) improvement in TUG score and BBS score as well (Table 3).
Table 1: Demographic data of group A and group B

<table>
<thead>
<tr>
<th></th>
<th>Group A (n=20) Mean (SD)</th>
<th>Group B (n=20) Mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (Years)</td>
<td>69.50 (2.91)</td>
<td>70 (3.29)</td>
</tr>
<tr>
<td>Gender (Male/ Female)</td>
<td>8/12</td>
<td>10/10</td>
</tr>
<tr>
<td>Height (cm)</td>
<td>160.26 (8.89)</td>
<td>160.90 (8.08)</td>
</tr>
<tr>
<td>Weight (Kg)</td>
<td>62.60 (6.15)</td>
<td>61.95 (5.81)</td>
</tr>
</tbody>
</table>

Table 2: Within group Pre and post training score analysis of TUG and BBS for group A and group B

<table>
<thead>
<tr>
<th>Group</th>
<th>n</th>
<th>Mean</th>
<th>SD</th>
<th>Pre-Post Mean (SD)</th>
<th>df</th>
<th>t value</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>TUG Group A</td>
<td>20</td>
<td>36.17</td>
<td>7.63</td>
<td>4.10 (3.86)</td>
<td>19</td>
<td>4.75</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td></td>
<td></td>
<td>32.07</td>
<td>7.53</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TUG Group B</td>
<td>20</td>
<td>33.60</td>
<td>10.64</td>
<td>9.45 (3.82)</td>
<td>19</td>
<td>11.09</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td></td>
<td></td>
<td>24.13</td>
<td>7.41</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BBS Group A</td>
<td>20</td>
<td>34.95</td>
<td>5.50</td>
<td>-5.25 (4.02)</td>
<td>19</td>
<td>-5.83</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td></td>
<td></td>
<td>40.20</td>
<td>4.40</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BBS Group B</td>
<td>20</td>
<td>33.90</td>
<td>6.40</td>
<td>-11.80 (4.63)</td>
<td>19</td>
<td>-11.40</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td></td>
<td></td>
<td>45.70</td>
<td>3.74</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3: Between group comparison for TUG and BBS values

<table>
<thead>
<tr>
<th>GROUP</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Mean Difference</th>
<th>df</th>
<th>t value</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>TUG Group A</td>
<td>32.07</td>
<td>7.52982</td>
<td>7.94100</td>
<td>38</td>
<td>3.362</td>
<td>0.002</td>
</tr>
<tr>
<td>TUG Group B</td>
<td>24.13</td>
<td>7.40976</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BBS Group A</td>
<td>40.20</td>
<td>4.408</td>
<td>-5.500</td>
<td>38</td>
<td>-4.253</td>
<td>0.000</td>
</tr>
<tr>
<td>BBS Group B</td>
<td>45.70</td>
<td>45.70</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

DISCUSSION

The functional balance of the geriatric person was evaluated with BBS and gait balance was evaluated by using TUG in this study. The comparison between pre post training BBS score and TUG score shows significant (p<0.05) improvement in functional balance and gait balance respectively in group A. Which indicates that narrow walking and obstacle walking is an effective training to improve balance in geriatric population. Walking ability is an integral part of many activities of daily living. Since many daily living tasks involve concurrent movements, measures of dual-task decrement are important. Full community ambulators display a significant increase in dual-task-related gait decrement. Yea-Ru Yang et al (2006) suggested that motor task related gait determinants are present for healthy subjects/individuals. Narrow walking & obstacle walking are the motor task related gait determinants. In narrow walking an individual has to walk and maintain the balance in narrow base. Whereas in obstacle walking an individual has to overcome the obstacles in the path.
and maintain his balance and walk. So, improving these determinants will improve gait. P. Silsupadol et al (2006) also showed that multiple task training improve gait in older adults better than single task training. [24] One possible explanation of this outcome is task coordination, which is required while walking. Here the participants used strategies to co-ordinate multiple task during walking, for example, walking in a plain surface but with narrow base and obstacle with in the path.

Motor skill acquisition is associated with the development of automaticity and induces neuroplastic changes in the brain. Debare. F. et al (2003) suggested, bimanual skill learning was associated with a shift of activation among cortico-subcortical regions, providing further evidence for the existence of differential cortico-subcortical circuits preferably involved during the early and advanced stages of learning. [25] They said that bimanual activation changes account for the transition from highly attention demanding task performance, involving processing of sensory information and corrective action planning, to automatic performance based on memory representations and forward control. In elderly people, coordinating and managing multiple tasks is crucial and reduced. So, training them in multiple tasks can improve their task coordination. Here in this study they improved their gait balance by doing task while walking. So narrow walking and obstacle walking can be a useful to improve gait balance in elderly person.

Participants of group B had undergone mental tasking along with narrow walking and obstacle walking which also showed effective (p<0.05) in improving balance in Geriatrics. Mental task requires more attention while performing. Various studies showed that in the dual task condition attention was substantially diverted from the visuomotor task when the balance was perturbed, presumably redirected to the control of the compensatory response required to re-stabilize. According to the task coordination and management hypothesis, ability to coordination and management of multiple task activity is reduced in older adults. It is believed that postural instability evokes cortical and autonomic reactions in addition to the primary compensatory response, and it is hypothesized that these responses may be related to underlying affective influences such as tonic physiological arousal. [26] Maki and McIlory concluded in their study that Physiological arousal may be a potential cofounder when attempting to understand the influence of attention on postural control. [27]

The comparison between the findings of both groups showed that mental tasking along with narrow walking and obstacle walking was more effective statistically (p<0.05) than narrow walking and obstacle walking. The mental task used in this study was type of math task which intend to increase both arousal and attention to be performed. So, the training procedure can improve both arousal and attention, thus improve the gait balance. The older adults may learn the procedure and compensatory mechanisms to maintain their postural stability during gait and improve the balance during gait. The changes in learning were associated with task-related changes in physiological arousal, and highlight the need to account for the potentially confounding influence of arousal when studying attentional effects. SmithRay RL, Hughes SL (2015) also showed similar effects where they hypothesized that walking abilities and cognitive function contribute to the multiple task effects on gait balance. [11]

As per neurophysiologic control of gait, the production of basic motor sequence is mediated by spinal cord mechanisms or central pattern generators which are neuronal networks capable of generating a rhythmic pattern of motor activity in the absence of phase sensory input from peripheral receptors. [28] So, multiple cortical and sub cortical areas contribute to functional gait. [29, 30]

CONCLUSION

It can be concluded in this study that the mental task and dual task training together can help or train a geriatric individual to stay aroused and attentive during walking and so the gait balance of that person is improved.

Source of Funding: Self

REFERENCES


Effect of Muscle Energy Technique and Active Release Technique on Hip Internal and External Rotation Range of Motion and Strength in Competitive Football Players: A Randomized Clinical Trial

Anil Muragod¹, Prajakta Patil², Shikha Ashish Raval², Prateek Hiremath²
¹Associate Prof. & Head, Department of Geriatric Physiotherapy, ²Intern, KAHER Institute of Physiotherapy, Belagavi, Karnataka, India

ABSTRACT

Background and Objectives: Researchers have shown a strong association between football players and decreased hip-rotation range of motion (ROM) which is a noteworthy risk factor for anterior cruciate ligament (ACL) injuries. Hence the aim of the study was to know the effect of Muscle Energy Technique (MET) and Active Release Technique (ART) along with conventional stretching on hip rotation range of motion and strength of the hip rotators.

Methodology: Ethical clearance was obtained from the Institutional Ethical Board, purpose of the study was explained and a written informed consent was obtained from all the participants who satisfied the inclusion and exclusion criteria. 34 subjects were then randomly allocated into two groups, Group A-MET (17) and Group B-ART (17) using the chit method. Intervention was given 3 times a week for 6 weeks. Outcome measures used were ROM and strength which were measured using goniometer and hand held dynamometer pre and post intervention.

Result: The mean age and BMI of the participants in Group MET were 19.94 years and 20.82 respectively; the mean age and BMI of the participants of Group ART were 20.18 years and 21.18 respectively. The p-value on both the sides, for internal and external rotation range of motion, within groups was <0.0001. Similarly the p-value on both the sides, for internal and external rotator strength within the groups was <0.0001, which suggests that both MET and ART were effective. When compared between MET and ART groups p-value was <0.0001 for both internal and external rotation range of motion and strength, which suggests that MET is better than ART in improving ROM and strength of hip rotators.

Conclusion: The present study concludes that both the interventions used in the study were effective in improving ROM & strength of hip rotators. When compared between the groups, MET showed better results.

Keywords: Competitive footballers, Hip rotator strength, Hip rotation range of motion, conventional stretching, MET, ART

INTRODUCTION

Football, also known as soccer is the most popular sport in the world played by men, women, children and adults with different levels of expertise.¹ Soccer performance depends upon a myriad of factors such as technical/biomechanical, tactical, mental and physiological areas.² Football players exhibit a large variation in joint biomechanics and thus have been successful in seeking attention of researchers about the morphological factors that may lead to different injuries.³ There are several factors which tend to increase the risk of injuries in football players such as age, career duration, previous injury and playing on a hard surface with high friction.⁴ Researchers have shown a strong association between football players and decreased hip rotation range of motion which is a noteworthy risk factor for Anterior Cruciate Ligament (ACL) injuries.⁵ The sport
is such that it includes sudden turning and increasing or decreasing of speed which places a high demand on the muscles and can result in muscle tightness.[4]

Two forms of manual therapy have been considered which emphasize on improving the range of motion and strength of hip joint. Muscle Energy Techniques (MET) are a class of soft tissue osteopathic manipulative methods that include precisely controlled and directed, patient initiated, isometric and/or isotonic contractions, at various levels of intensity designed to improve musculoskeletal function and reduce pain. The uses of this technique include pain reduction, stretching tight muscles, strengthen weak muscles and mobilization of restricted joints.[5] Active Release Technique (ART) is a manual therapy technique which is recruited for the recovery of the soft tissue function which involve removal of the scar tissue that can result in pain, stiffness, mechanical dysfunction in muscles, myofascia and soft tissue.[6] Active Release Technique has three distinct objectives: Restoring free and unimpeded soft tissue movement, release of vasculature, entrapped nerves and lymphatic, and to regain normal texture, resilience and soft tissue function.[7] The effectiveness of ART has been reported for reducing pain and increasing the range of motion in patients with partial tear of the supraspinatus tendon.[6][8]

METHODOLOGY

Ethical Clearance was obtained from the Institutional Ethical Committee. The subjects were screened based on the inclusion and exclusion criteria. Inclusion Criteria were competitive male football players with age of 18–25 years, professional experience of 3 years and those volunteering to participate in the study. Exclusion Criteria were recent injuries in the last 6 months, pain in the hip joint and recent operations in the lower limb in the last 12 months. According to the above mentioned criteria, subjects were requested to participate in the study. Participants were explained about the purpose of the study and the intervention. A brief demographic data which included age, gender, height, weight, BMI, age of commencement of playing football and years of experience of playing competitive football and a written informed consent was obtained from each subject who were willing to participate in the study.

The recruited participants were randomly segregated into two groups using the chit method: Group A received Muscle Energy Technique along with conventional stretching and Group B received Active Release Technique along with conventional stretching. Both the interventions were given on 3 alternative days of the week for 6 consecutive weeks for 30 minutes including stretching prior to the daily football practice sessions. ROM and strength of hip internal and external rotators were used as outcome measures. Both hip internal and external ROM and strength was assessed using goniometer and hand held dynamometer in high sitting position. The ROM and strength were measured pre intervention and after 6 weeks of post intervention.

RESULTS

DEMOGRAPHIC PROFILE

Age & BMI distribution

Age of the participants in the study was between 18 – 25 years. The mean age of participants in Group A was 19.94 ± 2.54 and the mean age of participants in Group B was20.18 ± 1.18.

The BMI of the participants in the groups were compared using ANOVA test. The mean BMI of participants in Group A was 20.82±1.70 and Group B mean BMI was21.18±1.81.

Table No. 1: Comparison of mean Age and BMI in both the groups

<table>
<thead>
<tr>
<th>Variables</th>
<th>Groups</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MET (n=17)</td>
<td>ART (n=17)</td>
</tr>
<tr>
<td>Age (Years)</td>
<td>19.94±2.54</td>
<td>20.18±1.81</td>
</tr>
<tr>
<td>Body mass index (Kg/m²)</td>
<td>20.82±1.70</td>
<td>21.18±1.81</td>
</tr>
</tbody>
</table>

OUTCOME MEASURES

GONIOMETRY

Group MET showed significance in left and right hip internal and external rotation range of motion; where the mean of left hip internal rotation range pre intervention was 35.82±6.20, post intervention was 41.59±7.42, and difference was 5.76±0.93 ($p<0.0001$),mean of right hip internal rotation range pre intervention was 41.76±7.15,post intervention was 47.06±6.06, difference was 5.30±0.49 ($p<0.0001$).
mean of left hip external rotation range pre intervention was 32.47±6.39, post intervention was 37.76±6.41, and difference was 5.29±0.43 (p<0.0001), mean of right hip external rotation range pre intervention was 29.65±5.38, post intervention was 36.71±6.26, and difference was 7.06±0.69 (p<0.0001).

Group ART showed significance in left and right hip internal and external rotation range of motion; where the mean of left hip internal rotation range pre intervention was 36.65±3.89, post intervention was 38.71±4.07 and the mean difference was 2.06±0.26 (p<0.0001), mean of right hip internal rotation range pre intervention was 41.24±6.84, post intervention 43.29±6.92 and difference was 2.05±0.30 (p<0.0001).

Both MET and ART were effective in improving ROM of IR and ER of hip with p-value of <0.0001. When compared between MET and ART groups, MET showed better results than ART with p-value of <0.0001.

**Table No. 2: Comparison of pre and post intervention for internal and external rotation ROM within and between the groups**

<table>
<thead>
<tr>
<th>Group</th>
<th>Left Pre-intervention</th>
<th>Left Post-intervention</th>
<th>Mean Difference</th>
<th>p-value</th>
<th>Right Pre-intervention</th>
<th>Right Post-intervention</th>
<th>Mean Difference</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INTERNAL ROTATION ROM</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MET</td>
<td>35.82±6.20</td>
<td>41.59±7.42</td>
<td>5.76±0.93</td>
<td>*&lt;0.0001</td>
<td>41.76±7.15</td>
<td>47.06±6.06</td>
<td>5.30±0.49</td>
<td>*&lt;0.0001</td>
</tr>
<tr>
<td>ART</td>
<td>36.65±3.89</td>
<td>38.71±4.07</td>
<td>2.06±0.26</td>
<td>*&lt;0.0001</td>
<td>41.24±6.84</td>
<td>43.29±6.92</td>
<td>2.05±0.22</td>
<td>*&lt;0.0001</td>
</tr>
<tr>
<td>p-value</td>
<td>0.646</td>
<td>0.173</td>
<td>*&lt;0.0001</td>
<td></td>
<td></td>
<td>0.827</td>
<td>0.101</td>
<td>*&lt;0.0001</td>
</tr>
<tr>
<td><strong>EXTERNAL ROTATION ROM</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MET</td>
<td>32.47±6.39</td>
<td>37.76±6.41</td>
<td>5.29±0.43</td>
<td>*&lt;0.0001</td>
<td>29.65±5.38</td>
<td>36.71±6.26</td>
<td>7.06±0.69</td>
<td>*&lt;0.0001</td>
</tr>
<tr>
<td>ART</td>
<td>32.06±5.64</td>
<td>33.16±5.77</td>
<td>1.12±0.17</td>
<td>*&lt;0.0001</td>
<td>31.18±4.47</td>
<td>32.29±4.63</td>
<td>1.11±0.21</td>
<td>*&lt;0.0001</td>
</tr>
<tr>
<td>p-value</td>
<td>0.843</td>
<td>*0.036</td>
<td>*&lt;0.0001</td>
<td></td>
<td></td>
<td>0.374</td>
<td>*0.027</td>
<td>*&lt;0.0001</td>
</tr>
</tbody>
</table>

**HAND HELD DYNAMOMETER**

Group MET showed significance in left and right hip internal and external rotator strength where mean of left hip internal rotator strength pre intervention was 9.59±2.37, post intervention was 11.41±2.45 and difference was 1.82±0.31 (p<0.0001), mean of right hip internal rotator strength pre intervention was 8.38±3.02, post intervention was 10.53±4.96, and difference was 2.15±1.15 (p<0.0001), mean of left hip external rotator strength pre intervention was 6.18±4.16, post intervention was 7.79±4.61 and difference was 1.61±0.19 (p<0.0001), mean of right hip external rotator strength pre intervention was 5.68±4.24, post intervention was 7.26±4.49, and difference was 1.58±0.18 (p<0.0001).

Group ART showed significance in left and right hip internal and external rotator strength where mean of left hip internal rotator strength pre intervention was 10.09±2.08, post intervention was 10.59±2.07 and difference was 0.50±0.17 (p<0.0001), mean of right hip internal rotator strength pre intervention was 8.74±3.94, post intervention was 9.29±3.63, and difference was 0.55±0.17 (p<0.0001), mean of left hip external rotator strength pre intervention was 6.74±3.26, post intervention was 7.09±3.17 and difference was 0.35±0.10 (p<0.0001),
mean of right hip external rotator strength pre intervention was 6.06±2.72, post intervention was 6.48±2.88, and difference was 0.42±0.12 (p<0.0001).

Both MET and ART were effective in improving strength of IR and ER of hip with p-value of <0.0001. When compared between MET and ART groups, MET showed better results than ART with p-value of <0.0001.

Table No. 3: Comparison of pre and post intervention for internal and external rotator strength within and between the groups

<table>
<thead>
<tr>
<th>Group</th>
<th>Internal Rotator Strength</th>
<th>External Rotator Strength</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left</td>
<td>Pre-intervention</td>
<td>Post-intervention</td>
</tr>
<tr>
<td>MET</td>
<td>9.59±2.37</td>
<td>11.41±2.45</td>
</tr>
<tr>
<td>ART</td>
<td>10.09±2.08</td>
<td>10.59±2.07</td>
</tr>
<tr>
<td>Right</td>
<td>Pre-intervention</td>
<td>Post-intervention</td>
</tr>
<tr>
<td>MET</td>
<td>6.18±4.16</td>
<td>7.99±4.61</td>
</tr>
<tr>
<td>ART</td>
<td>6.74±3.26</td>
<td>7.09±3.17</td>
</tr>
<tr>
<td>p-value</td>
<td>0.523</td>
<td>0.298</td>
</tr>
</tbody>
</table>

DISCUSSION

The result of the present study showed significant increase in range of motion and strength of hip internal and external rotation post intervention in both the groups.

In the present study, the age of the players was between 18 to 25 years. A study was conducted on incidence of decreased hip range of motion in youth soccer players and response to a stretching program on 262 male soccer players, the age group of the players was between 9 to 19 years which is lesser in comparison to the present study. A study was done to find out an association between hip range of motion and non contact ACL injuries in soccer players. The age group of the players was between 18 to 35 years which is almost similar to the present study. In the current study, Muscle Energy Technique Group showed significant improvement in the hip range of motion and strength of hip rotator muscles. A study was done on the effect of Muscle Energy Technique in increasing range of motion and strength of glenohumeral internal rotator in athletes with glenohumeral internal rotation deficit (GIRD). Both the interventions were given for two weeks. The study concluded that Muscle Energy Technique improved the range of motion and strength of the glenohumeral internal rotators. The increase in ROM is by stretching the tight muscles thus increasing the muscle flexibility and increase in strength.
is due to isometric contraction of the muscle.\cite{5}

Another study was done on the effect of MET and PRT in acute low back ache on pain and disability. Both the interventions were given for 8 days. It concluded that MET was effective in reducing the pain and increasing the lumbar extension range of motion after 8 days of treatment.\cite{11}

In the present study, Active Release Technique Group showed significant increase in range of motion and strength as it restores soft tissue movement and regains normal soft tissue function. Supporting this study, a study was done which compared the effect of Active Release Technique and Mulligan Bent Leg Raise in subjects with hamstring tightness on 40 subjects. The subjects received a single session of both the interventions whose results showed immediate improvement in the hamstring flexibility and range of motion.\cite{7}

Contradictory to this study there was a study which was done to determine if ART could be used as an effective way to influence the strength and muscle inhibition in quadriceps muscles of athletes with anterior knee pain. The athletes received a single session of ART and strength of the quadriceps muscles was assessed 2 minutes and 20 minutes after the treatment. There was no improvement in the strength of the quadriceps muscles after 2 minutes and 20 minutes of the treatment.\cite{12}

In the present study, universal goniometer has been used to assess the range of motion of hip internal and external rotation in football players before and after the intervention. There was a significant increase in the range of motion in both the groups after intervention. Different studies were done which concluded that goniometer has a good reliability and intra-tester measurement is more reliable than inter-tester measurement.\cite{13,14}

In the present study, Hand Held Dynamometer was used to assess the strength of hip internal and external rotators before and after intervention. The study clearly showed that the intervention improved the strength of the rotator muscles in both the groups. A study was done whose results suggested that Hand Held Dynamometer is a reliable method to assess strength.\cite{15}

In this study, there was significant increase in range of motion and strength in both the groups, but Group MET participants showed more significant increase in range of motion and strength than Group ART participants. Hence it is observed that Muscle Energy Technique proved to be more effective than Active Release Technique in football players.

**CONCLUSION**

The present study concludes that both the interventions used in the study were effective in improving ROM & strength of hip rotators. When compared between the groups, MET showed better results.

**Conflict of Interest:** None

**Source of Funding:** Self

**Informed Consent:** Obtained

**Ethical Clearance:** Obtained

**REFERENCES**


To Compare the Effectiveness of Active Release Technique and Conventional Physical Therapy in the, Management of Upper Cross Syndrome

Sneha Joshi¹, Namrata Srivastava²
¹HOD, ²Assistant Professor, Career College, Department of Physiotherapy, Bhopal

ABSTRACT

Objective: This study is aimed to find out the effectiveness of active release technique along with the conventional physical therapy in the management of upper cross syndrome.

Study Design: Experimental study design.

Subjects: 20 patients between the age group of 16-60 years having upper cross syndrome were selected as per the inclusion and exclusion criterion.

Procedure: In this study 20 subjects who met the inclusion criteria, were explained about the study protocol and after obtaining informed consent from them, they were randomized into two groups- control group and experimental group. Subjects in control group received only conventional therapy.

Along with conventional therapy the Experimental group subjects received active release technique, 3 sets of 10 repetitions per session for 4 days per week. This study was performed for 3 weeks. Outcomes measures were SPADI.

Result: Subjects receiving MFR along with conventional therapy showed reduction in symptoms with an improvement in the quality of life.

Conclusion: The results indicate that Active release technique with conventional therapy is more effective than conventional therapy alone in the management of upper cross syndrome.

Keyword: Upper cross syndrome, Active release technique (ART)

INTRODUCTION

Upper Crossed Syndrome is defined as tightness of the upper trapezius, pectoralis major, and levator scapulae and weakness of the rhomboids, serratus anterior, middle and lower trapezius and the deep neck flexors especially the scalene muscles. ¹,²

The primary cause of upper crossed syndrome is chronic postural stress to the upper body. Most tasks that we perform require us to work down and in front of ourselves, causing us to flex the upper spine, protect the head, protect the shoulder girdles, and medially rotate the arms. Due to repetitive effort and prolonged postural stress muscles get tighten. When a muscle is tight it tends to weaken and when a muscle is weak it tends to be tight. The other soft tissues may also be drawn tightly. As a result of weak and tight tissues, the internal forces acting on the tissues rise. Friction, pressure or tension can be present, or all at the same time. If one or more of these factors is high enough, an acute injury and inflammation can result even without external forces being applied. The effect of increased forces on the tissues is decrease circulation. If pressure is applied over one of the vulnerable low-pressure lymphatic channels the result is edema. External forces in the form of constant pressure or tension injury may also have the effect of decreasing circulation or causing edema. Cellular hypoxia from restricted circulation causes fibrosis and adhesions to occur in the and between tissues. ⁴,⁶
This syndrome can cause multitude of dysfunctions within the body including headaches, early degeneration of the cervical spine, and loss of the cervical curve. In addition, UCS can cause an abnormal kyphotic thoracic spine and altered biomechanics of the glenohumeral joint. Altered biomechanics of the cervical spine may lead a loss of cervical curve and, if not addressed, degeneration of cervical spine. This alterations in function of the musculature, in people with UCS, often cause these individuals to develop chronic headaches.

Active release techniques are used to treat inflammation of muscle, tendon and ligament secondary to repetitive stress or frank injury. Although many studies have reported the effectiveness of exercise programs in treatment of UCS, study on the combination of active release technique along with prescribed exercise is currently insufficient. Hence need of study exists.

**METHODOLOGY**

**Study design:** Experimental design.

**Sample technique:** Simple random sampling method.

**Sample size:** subjects were selected for study.

They were randomly divided into 2 groups; control group and experimental group with each group having 10 subjects.

**Study setting:** It was conducted in an outpatient setting in physiotherapy department of Career Institute of Medical Science BHEL, Bhopal (M.P).

**Inclusion criteria:**

1. Male and females between the age group- 16 to 60 years.
2. Diagnosed with pain as having UCS
3. Not participating in any formal physical rehabilitation program.
4. Screened positive in diagnostic tests

**Exclusion criteria:**

1. Surgeries to the cervical area.
2. Subjects taking analgesics and muscle relaxants.
3. Known thoracic scoliosis
4. Pregnancy

**Duration of protocol:**

The total duration of protocol was 3 weeks, 4 times weekly.

**Data collection procedure:**

Subjects who met the inclusion criteria, were randomized into two groups.

**Control group:** Subjects received TENS followed by muscle stretching and strengthening exercise.

**Experimental group:** Subjects received TENS followed by ART of muscles involved in UCS. This was followed by muscle stretching and strengthening exercise.

**METHOD OF APPLICATION OF TREATMENT**

**TENS**

Subjects received TENS of continuous mode pulse width of 260 and plus rate between 80-100hz. TENS was given for 20 minutes for 4 days per week for a period of 3 week intervention.

**ACTIVE RELEASE TECHNIQUE**

ART level 4 is was given to the subjects. It start from commonding the patient to actively contract the muscle therapist made firm contact over the adhisions. The patient then lengthens the muscle with slow and steady motion while the therapist maintains pressure over the muscle. In this study ART is given to pectoralis major and minor, trapezius and levator scapulae and SCM.

Out come measures-

The two outcome measures used are:-

SPADI b) MMT

**STATISTICAL ANALYSIS**

This chapter deals with analysis of data collected with SPADI of 20 subjects. Suitable statistical analysis test was used in order to verify the investigation of the study. Statistics was performed using the software SPSS 17.0. The characteristics of the data are presented through tables. Pre and post test scores of SPADI were analyzed using paired t-test within the group and unpaired t-test.
between the groups. Significant level was defined at P<0.05.

RESULT

A sample of 20 patients was selected and allocated randomly into 2 groups of 10 subjects using random sampling method.

Table-1: Comparison between Pre test scorrs of Experimental group and control group using SPADI score

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>S.D.</th>
<th>t</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>PAIN</td>
<td>Exp.</td>
<td>56</td>
<td>2.1</td>
<td>0.231</td>
</tr>
<tr>
<td></td>
<td>Cont.</td>
<td>55.8</td>
<td>1.98</td>
<td></td>
</tr>
<tr>
<td>DISABILITY</td>
<td>Exp.</td>
<td>56.8</td>
<td>1.79</td>
<td>-0.480</td>
</tr>
<tr>
<td></td>
<td>Cont.</td>
<td>57.12</td>
<td>1.67</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>Exp.</td>
<td>86.81</td>
<td>2.617</td>
<td>-0.44</td>
</tr>
<tr>
<td></td>
<td>Cont.</td>
<td>86.85</td>
<td>2.617</td>
<td></td>
</tr>
</tbody>
</table>

Table-2: Comparison between Post test scorrs of Experimental group and control group using SPADI score

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>S.D.</th>
<th>t</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>PAIN</td>
<td>Exp.</td>
<td>26.2</td>
<td>1.475</td>
<td>-12.075</td>
</tr>
<tr>
<td></td>
<td>Cont.</td>
<td>35.2</td>
<td>1.932</td>
<td></td>
</tr>
<tr>
<td>DISABILITY</td>
<td>Exp.</td>
<td>23.45</td>
<td>1.413</td>
<td>-14.511</td>
</tr>
<tr>
<td></td>
<td>Cont.</td>
<td>33.12</td>
<td>1.792</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>Exp.</td>
<td>38.19</td>
<td>1.463</td>
<td>-32.58</td>
</tr>
<tr>
<td></td>
<td>Cont.</td>
<td>52.55</td>
<td>1.672</td>
<td></td>
</tr>
</tbody>
</table>

DISCUSSION

This study is based on the research hypothesis that ART along with conventional therapy will be more effective for patients with UCS than with conventional therapy alone and was completed with 20 patients. The dependent variable used in this study is SPADI. SPADI has two domains: 5 items subscale to measure pain and 8 item subscale to check disability.

The independent variable used in this study is ART along with conventional therapy. It has been advocated that both groups received conventional therapy including TENS and stretching, strengthening exercises. The effect of TENS in pain relief and increases circulation and tissue healing in patients with UCS have been well advocated.

In this study we observe the effectiveness of ART on patients of UCS. Documentation of the research indicates the use of exercise alone can be moderately successful in correcting this syndrome.

CONCLUSION

Results of this study suggest that a combination of ART and conventional therapy for a period of 3 weeks is more effective for decreasing symptoms of patient sufferings from UCS than conventional therapy alone.

FUTURE RESEARCH

A large sample size, by conducting individual studies over individual techniques a precise knowledge as to which technique plays a major role in the reduction of its frequency and intensity can be obtained.
Conflicts of Interest/ Source of Funding- Nil

Ethical Clearance: We certify that this study involving human subjects is in accordance with the regulations stated by ethical committee.

REFERENCES

2. Berit Schiottz-Christensen, Vert Mooney at all. The role of active release manual therapy for upper extremity overuse syndromes
7. Mark Johnson, Transcutaneous electrical stimulation, CHAPTER 17, the clinical effectiveness of tens and electrode positioning
Comparison of Effectiveness of Upper Quarter Neurodynamic Treatment and Cervical Traction in Cervical Radiculopathy- A Pilot Study

Abhilash P.V1, Mayur Rai1, Princy M Narayanan2, Priya S1

1Assistant Professor, Department of Orthopaedics, A.J Institute of Medical Sciences, Mangalore, 2Post Graduate Student, LMCP, Mangalore

ABSTRACT

Cervical radiculopathy is a neurological condition characterized by the dysfunction of a cervical spinal nerve, nerve root or both. Neural mobilization uses the specific position and movements of neck and arm to reduce nerve mechanosensitivity, resolve symptoms and restore function. Studies have shown that cervical traction is effective in relieving radiating pain and its associated disability and a few studies have shown that neural mobilization provides immediate benefits without harmful effects.

Objectives: To compare the effectiveness of neurodynamic treatment and intermittent cervical traction in cervical radiculopathy.

Methodology: Thirty subjects aged 18-70 years, both gender with unilateral upper extremity pain, paresthesia or numbness, 4 positive findings:- positive Spurlings test and distraction test and upper limb tension test, <60 degree ipsilateral cervical rotation were recruited for this pilot interventional study. Selected subjects were equally divided and randomly allocated two experimental group:- Group A and B by chit pick method. Group A received intermittent cervical traction , myofascial release(MFR), strengthening to deep flexor muscles of neck and scapulothoracic muscles while Group B received Neurodynamic treatment (NDT), MFR, strengthening for deep flexor muscles of neck, and scapulothoracic muscles. Outcome measure used was Neck disability index (NDI) before treatment and after one week treatment.

Results: Statistical analysis of mean difference of pre and post disability was done by paired t-test and comparison of effect of treatment between 2 groups by students t test. The results have showed that there is high significance (p< 0.05) between two groups .

Conclusion: Findings of this pilot study shows that there was high significant difference between both group treatment. This study concluded that NDT was more effective in management of cervical radiculopathy along with MFR and strengthening in reducing pain and improvement in neck function.

Keywords: Cervical radiculopathy, neurodynamic treatment, intermittent cervical traction, and neck disability index.

INTRODUCTION

Cervical radiculopathy (CR) is a common neuro-musculoskeletal disorder causing pain and disability. It is common in general population, with the annual incidence of approximately 83 per 100,10001. People with neck pain combined with upper extremity symptoms experience greater level of disability than do people with neck pain alone2. The onset is insidious ad most commonly is caused by compressive or inflammatory pathology from a cervical disc derangement or other space occupying lesion such as disc herniation, spondylitis spur or cervical osteophyte, resulting in nerve root inflammation, compression or both2.
Patient usually complaints of pain, numbness, tingling sensation and weakness in upper extremity which often result in significant functional limitation and disability. In the treatment for cervical radiculopathy, evidence suggests that patient who is treated conservatively may experience superior outcome compared to those who undergo surgery.

Cervical traction and neural mobilization techniques have been advocated in management of the radiculopathy due to their immediate analgesic effect\(^4,5\).

Neural tissue management uses the specific position and movements of neck and arm To reduce nerve mechnosensitivity, resolve symptoms and restore function. Neurodynamic sequence is the performance of a set of component body movement so as to produce specific mechanical events in nervous system, according to that sequence of component movement. Neurodynamic sequencing relies on the principle that nervous system does not behave uniformly. The sequence of the movement influences the localization of particular mechanical stress in nervous system\(^6\).

The Neck Disability Index (NDI) is the most often used outcome measure for self-reported disability in patients with neck pain\(^7\). The NDI self-report measure contains seven items related to activities of daily living, two items related to pain, and one item related to concentration (ability to read). Each item is scaled from 0 to 5, and the total score is expressed as a percentage, with higher scores representing greater levels of disability. The maximum total score is 50 points, and the minimum of 0 implies no disability. A change of >7.0 points was found to exceed the threshold for meaningful clinically important change in patients with CR. Test-retest reliability has been recently reported to be moderate (ICC = 0.68) in patients with CR \(^8\).

The analgesic effect of both cervical traction and neurodynamic treatment has been explored and recognized in many RCT studies with these in turn being analysed in systematic reviews (Ellis and Hing, 2008; Boyles et al., 2011).\(^9\)

A study by Maitland et al., 2005 Coppieters and Butler, 2008 described that both cervical traction and neural mobilization techniques have been advocated in the management of CR due to their immediate analgesic effect\(^10,11\).

Takasaki et al., 2009 found that cervical traction is applied to provide pain inhibition, through widening of cervical neural foramina and the reduction of intradiscal pressure. That means cervical traction will reduce the symptoms in CR since main cause for cervical radiculopathy is disc related problem\(^12\).

In addition Butler,2000; Coppieters and Butler, 2008 found that neurodynamic treatment are widely used to normalize cervical nerve structure and function via possible reduction of nerve adherence and decreased neural mechno sensitivity.\(^10\)

Many studies proved that cervical traction is effective in reliving radiating and its associated disability which could be beneficial for symptoms in cervical radiculopathy the widening of disc space during traction, in effect pushes back the herniated nuclear substance into place by stretching posterior longitudinal ligament. Hence the pressure of irritation on nerve root will be relieved which helps in reduction in pain intensity.

A RCT conducted by Bukhari et al, in which they compared the effectiveness of mechanical and manual traction combined with mobilization and exercise therapy in patients with cervical radiculopathy. They concluded that patients treated with mechanical traction managed pain and disability more effectively than manual traction group\(^14\).

A case report done by Savva et al describes the effect of cervical traction combined with neural mobilization on pain and disability in cervical radiculopathy. They found that application of cervical traction combined with neural mobilization can produce significant improvement in terms of pain and disability in cervical radiculopathy\(^15\).

One study (experimental study design) by Smati et al, comparing the effectiveness of both neurodynamic treatment and cervical traction. The results showed that both nerve mobilization and cervical traction are effective treatment option in treatment of cervical radiculopathy
in which nerve mobilization is more effective. A multitude of physical therapy interventions has been proposed to be effective in the management of cervical radiculopathy mechanical cervical traction, manipulation, therapeutic exercise and modalities. But only one study has directly compared the two different treatment procedure and has seen the effect of nerve mobilization in comparison to conventional therapy. The aim of this study is to compare the efficiency of neurodynamic treatment (Shacklock concept) with intermittent cervical traction for cervical radiculopathy.

**MATERIALS AND METHOD**

A pilot interventional study was conducted during the period May 2017 to May 2018. Universal sampling was used to recruit subjects into the study. The subjects were selected from the tertiary hospital in Mangalore. The study protocol was approved by the Institutional Ethical Committee (AJ Institute of Medical Sciences And Research Centre).

Subject of 18-70 years of age diagnosed with cervical radiculopathy who have showed positive for four positive test:- positive spurling test and distraction test, any of ULTT test as positive and ipsilateral cervical rotation <60degree) and positive valsalva manoeuvre and shoulder abduction test. Exclusion criteria included were bilateral symptoms, any history of cervical & thoracic surgery, history of trauma, any infectious and inflammatory disease of spine, any congenital deformity of spine, vertebro basilar insufficiency, signs or symptoms of upper motor neuron disease, medical “red flags”, cervical spine injections (steroidal) in the past 2 week, current use of steroidal medication prescribed for radiculopathy symptoms.

A total of 43 subjects were screened and 30 subjects were selected for the study who met the inclusion criteria. Subjects were then randomly allocated and equally divided into two groups by simple randomised sampling method using chit pick method. Prior to starting the procedure, subjects was informed about the examination and treatment procedure and consent is obtained verbally. Patient with reports of unilateral upper extremity pain, numbness, paraesthesia was screened by examiner for study eligibility.

The standardized history was taken which consisted of age, gender, past medical history, location (with the use of a body diagram), duration and nature of symptoms, relieving /aggravating activities, prior episodes, occupation and leisure activities. The physical examination was consisted of a postural assessment, neurological assessment (myotomes, dermatomes, and reflexes), cervical and thoracic active range of motion while monitoring of symptom behaviour, segmental mobility testing of the cervical spine, and examination of deep neck flexor and scapula-thoracic muscle strength.

After initial assessment one group was given upper quadrant neurodynamic treatment, myofascial release and strengthening to deep flexor muscles of neck and scapula-thoracic muscles and other group was given Intermittent cervical traction with myofascial release, strengthening to deep flexors of neck and scapula-thoracic muscles.

**Neurodynamic sequence include**

Step 1: remote sequence, remote slider; slider using unaffected joints and affected area is placed in neutral/symptom free position

Step 2: Remote sequence, remote slider; slider using unaffected joints, affected area is placed in some ROM, but with or without minimal symptoms.

Step 3: Remote sequence, local sliders; move affected area + any other area, but with or without minimal symptoms.

Step 4: Standard sequence, local sliders; with or without minimal symptoms.

Step 5: Standard sequence, tensioners; with or without minimal symptoms(preferably 1 joint tensioner)

Step 6: Sliders; Level 3a/3b with or without minimal symptoms(preferably 2 ended sliders)

Step 7 : Tensioners; Level 3/3b with or without minimal symptoms (preferably 2 ended tensioners)

3C for Closing Dysfunctions

Same till Step 1-5

Then Step 6: Dynamic opener + Nerve Tensioner-relax both structures

Step 7 : Dynamic closer+ Nerve Tensioner- Relax
both structures

3 sets of 10 repetition in each set at moderate pace for one min and 2min rest will be given

Cervical traction parameters

Each patient was positioned supine with cervical spine placed at an angle of approximately 15 degrees of flexion. The traction force was started t 10% of body weight .The on/off cycle will be set at 60/10 for 15min.

Education

In the initial visit, patients were educated on importance of correct postural alignment of the spine during sitting and standing activities. Necessary corrections will be made on subsequent visit if needed.

Strengthening Exercise

Subjects were instructed to perform deep flexor strengthening exercise without the use of biofeedback described by Petersen. Subjects were instructed to lie down supine with cervical spine in neutral. Then they were instructed to flatten the curve of neck by nodding the head and holding in that position for 10 seconds and repeated for 10 times.

Scapulo-thoracic exercise include serratus anterior and both middle and lower trapezius muscle strengthening as described by Flynn et al

Lower and middle trapezius strengthening

The patients were instructed to be in prone position and were instructed to horizontally abduct the shoulder with scapular depression, adduction and upward rotation with approximately 120-135 degree abduction for lower trapezius muscle re-education and approximately 90 degree of abduction for middle trapezius muscle re-education. Shoulder should be externally rotated so that thumbs points up towards the ceiling with scapula stabilized by the examiner

Serratus Anterior strengthening

Part 1: The subject should stand at the wall with arms approximately shoulder width apart

Part2: The subjects then performed a push up with a plus exercise by pushing away from the wall until elbow is fully extended and scapulae are protracted as far as possible.

All patients were instructed to perform all strengthening exercise at home twice daily.

FINDINGS

Descriptive statistics showed that the minimum age of participants were 20 years and maximum was 67 years, and mean age of the 30 subjects were 40.26 ± 13.11. The intra group pre and post test data for NDI and NPRS were analysed using paired t test while post test inter group data were analysed using independent t test.

Table.1 : Mean difference of ICT (group A) and NDT (group B)

<table>
<thead>
<tr>
<th>NDI</th>
<th>Group A</th>
<th>Significance</th>
<th>Group B</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre</td>
<td>59.8667</td>
<td>6.39047</td>
<td>0.005</td>
<td></td>
</tr>
<tr>
<td>Post</td>
<td>47.7333</td>
<td>6.45276</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>53.3333</td>
<td>8.37229</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>31.3333</td>
<td>6.07885</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table. 2 : Comparison of post intervention - ICT and NDT

<table>
<thead>
<tr>
<th>Independent t test</th>
<th>Group A Vs Group B</th>
</tr>
</thead>
<tbody>
<tr>
<td>t Value</td>
<td>p value</td>
</tr>
<tr>
<td>-7.165</td>
<td>p&lt; 0.05</td>
</tr>
</tbody>
</table>
DISCUSSION

The present study looked at the effect of cervical traction and neurodynamic treatment in patients experiencing CR. The findings have demonstrated significant improvements in terms of pain and disability after giving neurodynamic treatment comparing to cervical traction. The significant improvement due to nerve mobilization can be due to following explanation. It is hypothesized that these therapeutic movements can have a positive impact on symptoms by improving intraneural circulation, axoplasmic flow, neural connective tissue viscoelasticity, and by reducing sensitivity of abnormal impulse generating system (AIGS), but these biologically plausible contentions have not been validated. These techniques may also be able to reduce unwanted fear of movement when provided in conjunction with appropriate neurobiology education, and therefore, they may reduce the reactivity of the pain neuromatrix. The mobilization of nerve roots increases their elasticity and is conducive to rearrangement of the area of the intervertebral disk convexity\(^{15,16}\). The result are in accordance with the work done by Smati et al who studied 20 patients with radiculopathy in which it showed that there was a significant improvement in patients who received non-surgical approach but more meaningful changed were seen in nerve mobilization group. As the present study concentrate on upper limb radiculopathy future study can be done in lower limb radiculopathy. Population can be taken as gender specific in further study. Even a comparison between neural mobilization and other manual therapy can also done in future.

LIMITATIONS

The current study had the following limitations, namely, a relatively small sample size and study period was very less(one week). There was no blinding done for the evaluators. This study only measured one outcome measure which might have limited the validity of the conclusion. The short term effect of neurodynamic study was analysed in this study but further research should be conducted to determine whether neurodynamic treatment will give benefits in long term. Other drawbacks was lack of control groups and short term follow up.

CONCLUSION

Findings of this study showed both interventions are effective therapeutic options in treatment of cervical radiculopathy. This results concluded that neurodynamic treatment is more effective than cervical traction in improving pain and disability in patients with cervical radiculopathy.

Conflict of Interest: The authors agree that there was no conflict of interest.

Source of Funding: No external source of funding was utilized for the study.

Ethical Clearance: Ethical clearance was obtained from Institutional Ethical Committee of AJ Institute of Medical Sciences And Research Centre.

REFERENCES

9. Ellis RF, Hing WA. Neural mobilization: a systematic review of randomized controlled trials with an analysis of therapeutic efficacy. Journal of


Management of Anxiety Related Disorder in Children with High Functioning Autism Spectrum Disorder Using Cognitive Behavioural Therapy

Srishti Choudhary¹, Rashida Begum²
¹Master of Occupational Therapy Student, ²Assistant Professor, Jamia Hamdard University
Hamdard Nagar, New Delhi

ABSTRACT

Background: To evaluate anxiety related disorders in children with High Functioning Autism spectrum disorder.

Objective: Effectiveness of cognitive behavioural therapy on anxiety in children with HFA.

Materials and Method: A pre-test post-test single group design was used. The study was conducted with 30 children with High functioning autism spectrum disorder. Permission was taken from special school setting located in New Delhi. 30 participants, fulfilling the inclusion criteria were selected. They were asked to given a written consent for the participation in the study. General assessment of participants was carried out. Anxiety was measured by Hamilton Anxiety Rating scale (HAM-A), Children Automatic Thought scale (CATS) and Spence children anxiety (SCAS). Cognitive Behavioural Therapy was given to those children with High functioning ASD.

Results: The results indicate that CBT treatment condition produced significant change in variable- anxiety level. On analysis marked improvement was found in Pre and Post Intervention scores highlight immense reduction in anxiety level in children with ASD.

Conclusion: The study conclude that the cognitive behavioural therapy interventions are effective in reducing anxiety among children with High Functioning ASD along with the demonstration of parent education program.

Keywords: Anxiety, High Functioning ASD.

INTRODUCTION

It is frequently noted that children with a High Functioning Autism Spectrum Disorder (HFA) experience anxiety, where HFA refers collectively to those children who have Autistic Disorder, without intellectual delay, together with those children who have Asperger’s Disorder. Anxiety related difficulties are so frequently exhibited in children with Autism Spectrum Disorders that DSM-IV highlights anxiety like responses as a common, “associated feature” of autism stating that “there may be excessive fearfulness in response to harmful objects”. Restricted and Repetitive Behaviors in Autism Spectrum Disorders: The autistic child desires to live in a static world, a world in which no change is tolerated. Only the child himself may sometimes take it upon himself to modify existing combinations.

Prevalence rates of anxiety symptomatology in children with HFA support the argument that anxiety is a core difficulty of many children who suffer with HFA. HFA children have been noted to experience anxiety across their school life, social life and family life. Children with autism spectrum disorders (ASD) are at increased risk for developing co-occurring mental health conditions and anxiety symptoms. Anxious youth may experience marked difficulties in social interaction and in family relationships. They may also perform below their ability level, affecting overall school performance and participation in after school activities. Furthermore, anxiety may exacerbate the core-deficits
of ASD, magnifying social inappropriateness, repetitive questioning, and ritualized behavior. It is important to consider other psychotherapeutic interventions that target underlying cognitions and behaviours that maintain the ASD individual’s anxiety for example, Cognitive Behaviour therapy (CBT)[7].

Occupational therapists may choose to use CBT under MOHO frame of reference for those who may have irrational thoughts about their abilities. Therapist using CBT with children with ASD and anxiety recognize that the social, cognitive and linguistic complexities of children with ASD may limit the accessibility of therapeutic interventions. For example, challenges with motivation, social understanding and imagination, atypical ways of demonstrating or reporting anxiety, difficulties with self-regulation, the presence of rigid thought processes, and poor generalization abilities may all impede therapeutic understanding. To address these challenges, common modifications to protocols for children with ASD include: concrete and visual teaching strategies, multiple choice lists, drawing, creative outlets for expression, and video modeling for hard-to-teach concepts[8].

**METHODOLOGY**

**Study Design** = pre and post test

**Location** = Purti Special school setting.

**Population** = High Functioning Autism Spectrum Disorder.

**Age** = 8 to 15 yrs.

**Sample Size** = 30

**Sampling Design** = Convenient Sampling.

**VARIABLE** - Anxiety.

**Inclusion Criteria**: Children diagnosed with ASD.

Age should be in between 8-15 yrs.

Children with IQ Above 70.

**Exclusion Criteria**: ASD Children with Low IQ.

Below 8 yrs of age.Anxiety with Children of ASD.

**Outcome Measure**: Hamilton Anxiety Rating Scale: The scale consists of 14 items designed to assess the severity of a patient’s anxiety. Each of the 14 items contains a number of symptoms, and each group of symptoms is rated on a scale of zero to four, with four being the most severe. The Hamilton Anxiety Rating scale has been considered a valuable scale for many years.

Spence Children Anxiety Scale: The Spence Children’s Anxiety Scale (SCAS) is a psychological questionnaire designed to identify symptoms of various anxiety disorders, specifically social phobia, obsessive-compulsive disorder, panic disorder/agoraphobia, and other forms of anxiety, in children and adolescents between ages 8 and 15. Developed by Susan H. Spence. Any form of the test takes approximately 5 to 10 minutes to complete. The questionnaire has shown good reliability and validity in recent studies.

Children’s Automatic Thoughts Scale (CATS): The CATS was originally designed to assess negative self-statements in children and adolescents. However, positive thoughts also play a major role in childhood disorders such as anxiety and depression. The application of the CATS-N/P can facilitate further research on cognitive factors in different childhood disorders.

**PROCEDURE**

The study was conducted with 30 High functioning ASD children were included in the study through random sampling between 8-15 yrs of age group and pre and post- test single group design was made and cognitive behavioural therapy was given for the duration of 4 weeks. The subjects were collected from Purti special school setting, Ashok vihar Delhi. Participation is voluntary and data would be handled confidentially. The procedures and purpose of study were described in detail to the parents and written informed consents were obtained. General assessment of children was carried out. Hamilton Anxiety Rating Scale (HAM-A), Spence Children Anxiety Scale (SCAS) and Children’s Automatic Thoughts Scale (CATS) was used to assess Anxiety. Therapist made a brief explanation about the questionnaires to parents. Occupational therapy interventions (Cognitive Behavioural Therapy) given to HFA children with Anxiety. Post assessment was done after 4-week intervention programme, duration of each session was 45 minutes. The score obtained was sent for data analysis.
**STATISTICAL INTERPRETATION**

Master chart was prepared on the excel sheet taking the pre and post values of different scales: CATS, HAM-A, SCAS (CQ), SCAS (PQ). Total 30 subjects participated in the study. Paired t-test was used to compare the pre test and post test values of anxiety level measured on CATS, HAM-A, SCAS (CQ), SCAS (PQ) respectively through SPSS software 17.0. Mean and level of Anxiety are improved.

**RESULT**

This study, explore anxiety in children with HFA and provide cognitive behavioural therapy as an intervention program to these children. Hypothesis, of the study was to evaluate anxiety in children with HFA who met the inclusion and exclusion criteria of the study. So, finding shows through pre-study score’s that children with HFA experience anxiety related disorders in different questionnaires. Hypothesis, of this study was to evaluate efficacy of cognitive behavioural therapy on children with HFA to reduce anxiety. Study shows significant result at p-value 0.01 level for anxiety. Mean scores of level of anxiety on CATS, pre and post CBT are (122.53±7.21) and (88.26±9.22) respectively shows significant improvement in anxiety.

Mean scores of level of anxiety on HAM-A, pre and post CBT are (24.96±3.50) and (19.23±1.56) respectively shows significant improvement in anxiety. Mean scores of level of anxiety on SCAS (Children Questionnaire (CQ)), pre and post CBT are (84.07±12.17) and (49.80±10.59) respectively. Mean scores of level of anxiety on SCAS (Parent Questionnaire (PQ)), pre and post CBT are (83.20±11.13) and (49.43±10.04) respectively shows significant improvement in anxiety.

**INTERPRETATION:** Mean scores of level of anxiety on CATS, pre and post CBT are (122.53±7.21) and (88.26±9.22) respectively. This shows that mean have reduced. Statistical analysis shows that results are highly significant at ‘p’ value of 0.0001.

**GRAPH – 2:** Showing decrease in the level of anxiety on HAM-A.

**INTERPRETATION:** Mean scores of level of anxiety on HAM-A, pre and post CBT are (24.96±3.50) and (19.23±1.56) respectively. This shows that mean have reduced. Statistical analysis shows that results are highly significant at ‘p’ value of 0.0001.

**GRAPH – 3:** Showing decrease in the level of anxiety on SCAS (CQ).

**INTERPRETATION:** Mean scores of level of anxiety on SCAS (CQ), pre and post CBT are (84.07±12.17) and (49.80±10.59) respectively. This shows that mean have reduced. Statistical analysis shows that results are highly significant at ‘p’ value of 0.0001.
**GRAPH – 4: Showing decrease in the level of anxiety on SCAS (PQ).**

**INTERPRETATION:** Mean scores of level of anxiety on SCAS (PQ), pre and post CBT are (83.20±11.13) and (49.43±10.04) respectively. This shows that mean have reduced. Statistical analysis shows that results are highly significant at ‘p’ value of 0.0001.

**GRAPH- 5: Showing severity of anxiety on HAM-A pre CBT.**

**INTERPRETATION:** This shows that severity of symptoms of anxiety on HAM-A pre CBT is increased.

**GRAPH-6**

**Showing decrease in severity of symptoms of anxiety on HAM-A post CBT.**

**INTERPRETATION:** This shows decrease in severity of symptoms of anxiety on HAM-A post CBT.

**DISCUSSIONS**

The current study represents the efficacy of cognitive-behavioural therapy intervention for treatment of anxiety disorders in children with HFA.

The aim of the study was to reduce anxiety level in children with ASD.

Interventions using Cognitive training, Relaxation Techniques and Coping strategies.

The approval was obtained from Ethical Committee of the University.

30 participants were selected for the study with IQ above 70, with age 8 to 15 yrs.

The Parents and Children were Informed about the study and they gave Informed consent. Assessment was done using CATS, HAM-A, SCAS (CQ), SCAS(PQ).

Intervention was given for 4 week duration and post assessment was done.

The results indicate that CBT treatment condition produced significant change in variable- anxiety level. On analysis marked improvement was found in Pre and Post Intervention scores highlight immense reduction in anxiety level in children with ASD.

Significant improvement was showing on various Assesment tools were:

The CATS scales were included in the current study to measure cognitive shift in the participants. The thought scores were significant pre and post test (Pre 122.53±7.21) and (Post 88.26±9.22) with the effectiveness of cognitive behavioural therapy intervention in reducing anxiety and also improving thought process of the children.[9]

CBT is effective for changing negative thoughts to positive thoughts, and also effective in reducing social threat of a child with ASD and enhancing positive thoughts and it leads to reduction in Anxiety level in social life anf family life[10]

The study also shown a significant results in children with ASD when measured on HAM-A, (Pre 24.96±3.50) and (Post19.23±1.56) with effectiveness of CBT in reducing symptoms of anxiety and improving mental health of an individual using various techniques as the part of the treatment[11].

Anxiety symptoms are reduced when CBT is used.
Reduction in physiological symptoms like Anxious mood, fears and also reduction in tensions on HAM-A reduction in anxiety symptoms as well improvement in physical issues[12].

This study showed the prevalence of anxiety among children with High Functioning ASD when measured on SCAS (CQ & PQ) with significant results in CQ (Pre 84.07±12.17) and (Post 49.80±10.59) & PQ (Pre 83.20±11.13) and (Post 49.43±10.04) with the effectiveness of cognitive behavioural therapy intervention in reducing anxiety.

Since, all the children and parent report data supported the beneficial effects of CBT intervention, it could be concluded that the efficacy of treatment extended at social environment and home environment. It seems reasonable to conclude that using CBT on children with ASD, separation anxiety was reduced along with social phobia. On the SCAS scale it is seen that reduction in anxiety level in these two domains (separation anxiety and social phobia).[13]

The parents were involved during initial process for assessment and post assessment after the intervention in the school setup and in the clinic among parents and observe their child to see the difference. Parent Education and Family Intervention has been used in the study.[14]

Children were interested and happy to perform the cognitive activities and cooperating throughout the intervention and have shown immense reduction on anxiety.

CONCLUSION

The study conclude that the cognitive behavioural therapy interventions are effective in reducing anxiety among children with High Functioning ASD along with the demonstration of parent education program. In the light of these finding we think that Cognitive behavioural therapy as an occupational therapy intervention are helpful to HFA children to deal with anxiety.

Ethical Clearance- Nil

Source of Funding- Nil

Conflict of Interest - Nil

REFERENCES


Meta-Analysis on Physiotherapy Modalities Used in Patients of Total Knee Replacement for Pain Relief

Neha J Mishra¹, Suvarna Ganvir²
¹Intern, DVVPFS College of Physiotherapy, Ahmednagar, ²Professor & HOD, Dept. of Neuroscience, DVVPF’S College of Physiotherapy, Ahmednagar

ABSTRACT

Background– Total knee replacement (TKR) surgery has become the most successful surgery for patients with severe debilitating arthritis.¹ Patients who undergo TKR show marked improvements in function and reduction in pain compared with their preoperative condition.³,⁴ However, recovery of functional ability is variable and not all patient experience significant improvements in pain and functions. This is probably due to lack of evidence related to effective pain relieving modality in patients with total knee replacement.

Material and Methodology – Full text articles from peer-reviewed journals were included. Intervention based studies in the form of Clinical Trials, Experimental Studies, Quasi experimental studies, were included. Due to Language and appropriate translation issue, only studies published in English language were considered.

Result & Conclusion– Following treatment interventions have been studied in details in patients with total knee replacement Kinesio taping, Dry Needling, ultrasonography guided pulsed radiofrequency (PRF) of nerves supplying the knee, TENS transcutaneous electrical stimulation and are found to be effective in pain relief.

Keyword– physiotherapy, pain, total knee replacement, Full text articles, Intervention based studies

BACKGROUND

Total knee replacement (TKR) surgery has become the most successful surgery for patients with severe debilitating arthritis.¹ During the past five years, the number of TKR performed in India has increased an average of 30% each year and the same growth rate is expected to continue in forthcoming decade². Over the past four decades, joint replacement surgery has become the most successful surgery for patients with severe debilitating arthritis.³ Patients who undergo TKR show marked improvements in function and reduction in pain compared with their preoperative condition.³,⁴ However, recovery of functional ability is variable and not all patient experience significant improvements in pain and functions. This is probably due to lack of evidence related to effective pain relieving modality in patients with total knee replacement.

Therefore it is necessary to provide best possible evidence for the most effective intervention for relief of pain in patients with total knee replacement. Hence this study is taken up to investigate the physiotherapy modality which has proved superior as against other modalities for pain relief, in the existing pool of literature.

Research Question: Which is the effective physiotherapy modality that can be used to relieve pain in patients after total knee replacement; as documented in the literature

Aim: To find out the most effective physiotherapy modality for pain relief for patients after total knee replacement (TKR), from the existing literature.

Objectives:

To provide comprehensive list of physiotherapy modalities that are used for relief of pain in patients with total knee replacement.

To investigate the effectiveness of each of the modalities for relief of pain.
To decide the best possible modality for relief of pain

**MATERIALS AND METHOD**

Full text articles from peer-reviewed journals were included. Intervention based studies in the form of Clinical Trials, Experimental Studies, Quasi experimental studies, were included. Due to Language and appropriate translation issue, only studies published in English language were considered. The study was carried out in Department Of Physiotherapy, VIMS Hospital Ahmednagar. Studies like Interventional/experimental study/case study, Studies including patients with total knee replacement either unilateral or bilateral and Studies with pain relief as one of the outcome measure were included in the meta-analysis. Articles in which patient had undergone both THR and TKR, retrospective studies and articles other than English language were excluded. PUBMED from 2000 to 2017 since recent advances needs to be evaluated. With keywords, medical subject headings, and search terms suggested by PUBMED. The keywords are - physiotherapy, pain, total knee replacement Searches are limited by date and are restricted to English publications only. Articles from PUBMED was searched by the investigator and guide. The titles and abstracts of all retrieved results was then screened for eligibility. The first screening process were aimed at narrowing down the volume of articles by rejecting all studies that are not relevant or appropriate according to the previously stated criteria. Duplicates were removed. Full-text versions of all relevant articles was evaluated by both. Further conclusion was made for the best pain relieving modality that can be used after total knee replacement. Descriptive statistics was used for analysing various parameters used in the included studies. Figure 1 Systematic review flow diagram shows the number of studies that were included and which studies were excluded (with reason).

Table 1 illustrates the articles review that has been selected for the final meta-analysis.

---

**Figure 1 Systematic review flow diagram**

- Record identified. N=(82)
  - Records excluded. N=(72)
    - Records on pain relief in TKR patients N=(10)
      - Not relevant. n=(0)
    - Records assessed for eligibility on basis of full article. N=(10)
      - Studies included N=(4)
        - 1. Irrelevant studies (22)
        - 2. Did not meet the needs of inclusion criteria (36)
        - 3. Treatment modalities were not mentioned (14)
        - 1. Modality were used with analgesics (2)
        - 2. Studies did not justify pain relief (3)
        - 3. Physiotherapy modality was not mentioned (1)
<table>
<thead>
<tr>
<th>Title</th>
<th>Material &amp; methodology</th>
<th>Protocol</th>
<th>Result</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The Effectiveness Of Kinesiotaping After Tkr In Early Postoperative Rehab Period Year : August 2014</td>
<td>Using simple randomization participants were divided into 2 groups a] kinesio taping b] control group No of participants: group 1: group 2:</td>
<td>Both The Groups Got The Same Physiotherapy Intervention TENS Laser therapy Paraffin therapy</td>
<td>Participants with kinesio taping had significant reduced pain as compared to the control group as well as there was no complains of skin irritation.</td>
<td>Kinesio taping can significantly reduce pain in patient who have undergone tkr</td>
</tr>
<tr>
<td>3. Acupuncture Provides Short-Term Pain Relief For Patients In A Total Joint Replacement Program Year: June 2015</td>
<td>Self-reported pain was assessed before and after acupuncture using a 0-10 scale and categorized as none/mild (0-4) and moderate/severe pain (5-10).</td>
<td>Physical Therapy Acupuncture</td>
<td>TKR patients experienced a significantly greater (p-value&lt;0.001) pain reduction on the second day or later after surgery (2.14, 95% CI: 1.98, 2.29) compared to the first day after surgery (1.66, 95% CI: 1.54, 1.79).</td>
<td>Acupuncture has significant pain relief in post TKR patient</td>
</tr>
<tr>
<td>4. Successful Management Of Chronic Postsurgical Pain Following Total Knee Replacement Year: February 2016</td>
<td>combination therapy that included ultrasonography guided pulsed radiofrequency (PRF) of nerves supplying the knee to provide pain relief, along with dry needling (DN) to relax myofascial triggers/bands that caused painful stiffness and restricted movement of muscles acting across the knee.</td>
<td>Dry Needling Ultrasonography Guided Pulsed Radiofrequency (Prf) Of Nerves Supplying The Knee</td>
<td>Both patients reported 50–60% pain relief immediately after PRF and volunteered that stiffness was reduced on Standing and walking, with a feeling of lightness. However, both had intermittent inflammatory symptoms in the form of swelling, warmth, and redness that subsided 1 month after DN</td>
<td>We present a new proposal that post-TKR CPSP is a neuromyopathy involving both motor and sensory nerves, relative benefits of each of the different treatment Modalities. However, the above proposal and the efficacy can be used in future studies.</td>
</tr>
</tbody>
</table>
DISCUSSION

In the above reviewed studies it was found that there are various techniques such as replacement Kinesio taping, Dry Needling, ultrasonography guided pulsed radiofrequency (PRF) of nerves supplying the knee, TENS( transcutaneous electrical stimulation) can be used to relieve pain but, TENS is found to be more commonly used modality to relieve pain. Which was used in 2 studies out of the 4 modalities on an average was used about 6-7 weeks and there was significant reduction in pain due to these modalities and regular physiotherapy. Talking about kinesiotaping when applied together with other modalities has pain reducing effect after TKR. However, according to the literature the exact benefit of the technique is still unclear, possibly effect could be placebo effect, pain reduction due to stability of the area that has to be treated. When it comes to Dry Needling, ultrasonography guided pulsed radiofrequency when combined together has an pain relieving effect mechanism of this technique i.e when PFR & DN is given in acute stage effects on the central and peripheral sensitization involving sensory and motor nerves motor neuropathy leads to development of new myofascial triggers and bands later relaxing the MTrPs hence reducing pain in the affected area.

In this study (the effectiveness of kinesiotaping after TKR in early postoperative rehab period) the author used kinesiotaping after TKR kinesio taping was well tolerated by the patient and did not interfere with their active participation in physical therapy exercise and other rehabilitation procedures. No side effects of the method were noted. They found that KT applied together with other modalities and rehabilitation has significant pain reducing effects exact benefit of the method is still unclear1,6 Using simple randomization participants were divided into 2 groups a) kinesio taping b) control group Both the groups got the same physiotherapy intervention. Participants with kinesio taping had significant reduced pain as compared to the control group as well as there was no complains of skin irritation. Clinical implication: this finding implies for healthcare professionals working in the field of physical medicine and rehabilitation that kinesio taping method is safe and can be used as additional rehabilitation means to reduce pain in patients with TKR.

In this study (comparative study of conventional therapy and additional yogasanas for knee rehab after TKR) the author added few yogasanas in one of the group the effects of additional yoga asanas combined with conventional treatment for functional outcome of patients after total knee replacement. He found that patients practicing yoga had better pain relief, less stiffness and better function. There were no adverse effects reported by subjects in either group. In experimental Yoga group, the pain relief was better than the conventional therapy group. Pain relief secondary to yoga practice in patients with knee OA is documented by Kolansinski et al.7 and Bukowski et al.8 Studies on the effects of yogasanas on osteoarthritis of hand by Garfinkel et al.9 and carpal tunnel syndrome by Garfinkel et al.10 reveal that yogasanas are beneficial in management of OA for reduction of pain while improving function. We believe that the reduction in pain can be attributed to Shavasana. When the activity of a facilitatory upper motor neuron is diminished in cerebral cortex, it will send fewer nerve impulses per second to lower motor neurons; this in turn will help in relaxation of the skeletal muscles. Conscious relaxation in Shavasana also helps in stimulation of inhibitory pathways, if such a neuron starts firing more nerve impulses per second than usual to the lower motor neurons, it would help silence the motor neuron independently causing muscle relaxation and pain relief in turn. Therefore the experimental group not only had muscle strengthening but also relaxation of the muscles allowing for faster recovery from pain. Bera et al.11 have found Shavasana as very effective to normalize effects of stress. Malathi et al.12 demonstrated positive effects of yogic practices on subjective well-being on 48 volunteers in a period of 4 months. Yoga practitioner group after the yoga session (0.20 mmol/kg) on 8 yoga practitioners. These findings demonstrate that in experienced yoga practitioners, brain GABA levels increase after a session of yoga.

In this study (Acupuncture Provides Short-term Pain Relief for Patients in a Total Joint Replacement Program) Self-reported pain was assessed before and after acupuncture using a 0–10 scale and categorized as none/mild (0–4) and moderate/severe pain (5–10). They received physiotherapy treatment and acupuncture together, the average short-term reduction in pain after receiving an application of acupuncture was 1.91 points (95%) as reported. For the average pre-pain score in the sample, 4.23, this reduction represents a 45% decrease in pain. Pain reduction was significantly greater (p-value<0.001) for acupuncture applications.
occurring on the second day after surgery or later compared to acupuncture received on post-surgical day one. Acupuncture has been shown to reduce the use of opioid analgesics as well as to aid in alleviating post-operative medication side effects including sedation, nausea, vomiting, and dizziness.\textsuperscript{13,14,15} Clinical finding is that acupuncture contribute to lower pain below the threshold at which patients would receive intravenous narcotics beyond the initial post-operative standard dose.

In this study (Successful Management of Chronic Postsurgical Pain Following Total Knee Replacement) the author used combination therapy that included ultrasonography guided Pulsed Radiofrequency (PRF) of nerves supplying the knee to provide pain relief, along with dry needling (DN) to relax myofascial triggers/bands that caused painful stiffness and restricted movement of muscles acting across the knee Along with physiotherapy.

PRF relieved CPSP pain but presumably had little effect on the pre-existing myofascial triggers generated in accordance to Hilton’s law, which states that “all of the motor efferent nerves serving muscles that act on the joint carry afferent branches from the capsular elements”.\textsuperscript{16} We utilized DN primarily to address this essential but hitherto neglected aspect of CPSP of TKR. PRF has been reported to produce transient endoneurial oedema, but not neuritis-like reactions, motor deficits, or Wallerian degeneration with the risk of differentiation pains, which are associated with CRF performed at 80°C.\textsuperscript{17,18} PRF delivers RF current in 20-millisecond high-voltage bursts with a “silent” phase (480 milliseconds), which allows time for heat elimination, maintaining the target tissue temperature below 42°C. The rapidly changing electrical field has been surmised to alter the transmission of pain signals through a pathway involving \textit{c-Fos}, an immediate early gene. PRF of the entire nerve supply of the knee presumably relieved pain from all tissues around the knee to provide sustained reduction of peripheral sensitization and its consequent central Sensitization.\textsuperscript{19,20} The reduction of pain, as evidenced by the NRS at rest and S-LANSS scores documented at 15 and 30 days. Hence PFR and DN can be used efficiently in future studies and clinical settings.

\textbf{CONCLUSION}

From the present study it can be concluded that following treatment interventions have been studied in details in patients with total knee replacement Kinesio taping, Dry Needling, ultrasonography guided pulsed radiofrequency (PRF) of nerves supplying the knee, TENS transcutaneous electrical stimulation and are found to be effective in pain relief. Due to limited number of studies & lack of common protocol across various studies it was difficult to pinpoint a single best modality. More expensive research is needed to establish the best modality.

\textbf{Ethical Clearance-} Ethical clearance was obtained from IEC of DVVPFs COPT Ahmednagar.

\textbf{Source of Funding-} Self funding

\textbf{Conflict of Interest} – Nil

\textbf{REFERENCE}


Association between Upper Limb Function and Functional Balance in Children with Spastic Cerebral Palsy: A Pilot Study

Padmanabhan Suresh Babu Roshan¹, Chandrashekar G S², Rakesh K R³, Haripriya S⁴
¹Assistant Professor, Laxmi Memorial College of Physiotherapy, Balmatta, Mangaluru, ²Associate Professor, Department of Paediatrics, A. J Institute of Medical Sciences, Kuntikana, Mangaluru, Karnataka, India, ³Post Graduate Student, ⁴Assistant Professor, Laxmi Memorial College of Physiotherapy, Balmatta, Mangaluru

ABSTRACT

Background: Cerebral Palsy (CP) describes a group of permanent disorders of the movement development and posture, which causing activity limitations. Seventy to eighty percent of children with cerebral palsy have spastic clinical features. Usually, upper limb impairment occurs in 50% to 70% of individuals with CP. Trunk balance is proposed to be an important contributor to voluntary upper extremity function, including motor control and dexterity in children with spastic CP. Some studies have found correlations between static posture and upper extremity function, but very few studies have compared functional balance and upper limb function in children with spastic CP. If there is any correlation found between functional balance and upper limb function, then treatment approaches can focus on balance training in order to improve upper limb function along with functional balance. Hence, this study was conducted to find if a correlation exists between upper limb function and functional balance.

Objectives: To determine correlation between upper extremity function and functional balance in children with spastic CP.

Methodology: Twenty children (age range 5-12 years, Gross Motor Function Classification System (GMFCS) Level I-III) with spastic CP were recruited for this pilot cross sectional study and evaluated using Pediatric Balance Scale (PBS) and Quality of Upper Extremity Skill Test (QUEST).

Results: On analysis using the Karl Pearson’s correlation coefficient, it was seen that there was a significantly strong positive correlation between QUEST and PBS scores with r=0.773 and p=0.000

Conclusion: Findings of this pilot study shows that there is a strong positive relationship between upper limb function and functional balance. Interventions to improve trunk control and balance may improve performance of upper limb function measures. Further studies are required to determine the influence of balance function on upper limb function.

Keywords: Spastic cerebral palsy, Functional balance, Upper limb function.

INTRODUCTION

Cerebral Palsy (CP) describes a group of permanent disorders of the development of movement and posture, causing activity limitations that are attributed to non-progressive disturbances that are occurred in the developing fetal or infant brain¹. One of the most basic functions of living organisms is the ability to control and move the body in space². Damage to the central nervous system cause disorders in neuromuscular, musculoskeletal and sensorial systems which leads to major motor disability³.

Corresponding author:
Rakesh K R
Post Graduate Student, Laxmi Memorial College of Physiotherapy, Mangaluru, Karnataka State, India.
E-mail address: physiorakeshkr@gmail.com
Seventy to eighty percent of children with cerebral palsy have spastic clinical features and affected limbs may demonstrate increased deep tendon reflexes, tremors, muscular hyper tonicity, and weakness. Increased tone in upper and lower extremities leads to difficulties in postural control in children with spastic CP.

Balance and postural control in the standing position are fundamental components of movement, involving the ability to anticipate and recover from instabilities as well as to take action to avoid instability. Poor balance also hampers the performance of functional activities of daily living.

The upper extremity is frequently affected in children with cerebral palsy. Arm movements, such as reaching and grasping, are essential for various activities of daily life. Almost 50% of children with CP present an arm-hand dysfunction. The Quality of Upper Extremity Skill Test (QUEST) is an outcome measure that evaluates movement patterns and hand function in children with cerebral palsy. The QUEST groups upper limb movement into four domains. Each domain focuses on areas of difficulty typically seen in children with spastic cerebral palsy: (a) Dissociated Movements, it measures ability to voluntarily isolate movement at the shoulder, elbow, wrist and fingers; (b) Grasps, which measures grasp function also rates sitting postures during grasps of 1 inch cube, cereal, pencil or crayon; (c) Weight Bearing, in this domain evaluate the ability to lean on the arms in prone or 4-point kneeling and sitting; and (d) Protective Extension evaluates using the arms to stop oneself from falling forward, backward and to the side.

The Pediatric Balance Scale (PBS) is a modification of the Berg Balance Scale and it is useful for assessing the functional balance of preschoolers and school aged children with CP. PBS consists of 14 tasks similar to activities of daily living.

Trunk stability is essential for limb movements. Trunk has an interdependent relationship with other body parts and nervous tissues. In normal developmental processes, trunk stability is related to the movement of the limbs. When the trunk is stable, the upper and lower limbs are freely usable for their normal purposes. Trunk control is essential for maintaining body balance and is also required for a stable base of support which is necessary to execute functional activities for limb movements. Because of this relationship between functional balance and trunk control, which is essential for a good upper extremity function, this study was conducted in order to correlate QUEST (upper extremity function) and PBS (functional balance) scores.

Various aspects of the sitting position in children with CP have also been investigated but very few studies have compared functional balance and upper limb function in children with CP. If there is any correlation found between functional balance and upper limb function, then treatment approaches can focus on balance training in order to improve upper limb function along with functional balance. Hence, this study was conducted to find if a correlation exists between functional balance and upper limb function.

MATERIALS AND METHOD

The study was part of a larger cross-sectional study conducted during the period May 2017 to May 2018. Purposive sampling was used to recruit subjects into the study. Study setting was special schools around a tertiary care teaching hospital in Dakshina Kannada district, Karnataka, India; permission was obtained from the concerned authoritarians from the special schools. The study protocol was approved by the Institutional Ethical Committee (AJ Institute of Medical Sciences And Research Centre).

Children of 5 to 12 years of age diagnosed with spastic cerebral palsy and of GMFCS levels I, II and III, who were able to understand the test instructions and able to sit without trunk and feet support were recruited for this pilot cross-sectional study. Exclusion criteria were children with any deformities/contractures in upper extremity, incompatible degree of comprehension and cooperation for performance of the activities proposed, and children with any visual and hearing impairment. After initial screening of the participants a total of twenty children who fulfilled the inclusion criteria were included. Informed consent was taken from the parents of the children. The subjects were evaluated using Pediatric Balance Scale (PBS) and Quality of Upper Extremity Skill Test (QUEST).

FINDINGS

Descriptive statistics showed that the minimum age of participants were 5 years and maximum was
12 years, and mean age of the 20 subjects were 8.85 ± 2.54. The participants were scored minimum score of 3 (i.e. poor balance) on PBS and maximum of 51 (i.e. good balance skills). The mean score was 29.05 ± 14.36. The participants were scored minimum score of 27.23 on QUEST and maximum of 86.93 (i.e. good upper limb function) with a mean score of 56.10 ± 17.39.

On analysis using the Karl Pearson’s correlation coefficient, correlation showed strong positive correlation between QUEST and PBS scores. Correlation coefficient r value is 0.773 with p = < 0.001 which showed very high significance with QUEST and PBS.

Pearson’s correlation was done between each domain of QUEST and PBS in the 20 samples. The PBS scores showed a very highly significant correlation with all four domains of QUEST except grasp. The correlations are shown in table 1.

### Table 1: Correlation between PBS scores and QUEST total and sub scores

<table>
<thead>
<tr>
<th>PBS</th>
<th>TOTAL(QUEST)</th>
<th>Dissociative Movement</th>
<th>Grasp</th>
<th>Weight Bearing</th>
<th>Protective Extension</th>
</tr>
</thead>
<tbody>
<tr>
<td>r</td>
<td>.773***</td>
<td>.799***</td>
<td>.561*</td>
<td>.683***</td>
<td>.620***</td>
</tr>
<tr>
<td>p</td>
<td>.000</td>
<td>.000</td>
<td>.010</td>
<td>.001</td>
<td>.004</td>
</tr>
<tr>
<td>N</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
</tbody>
</table>

Figure 1: Scatter diagram of correlation between PBS and QUEST total scores
DISCUSSION

Functional balance is very much required for attaining good postural stability. In children with spastic CP their ability to control body posture and functional balance will be affected, which leads to many functional disabilities. The present study was conducted to determine the correlation between upper limb function and functional balance by using Quality of Upper Extremity Skill Test and Pediatric Balance Scale in children with cerebral palsy. The results showed that there was a strong positive correlation between these outcome measures.

In the present study we included children who were of GMFCS levels I, II, and III i.e. children who were ambulating independently with or without assistive devices. Among the 20 children included in the study 15 were boys and 5 girls. 8 were of GMFCS level I, 5 of GMFCS level II and 7 of level III. For classifying gross motor function in CP, the primary factor has been indicated to be the ability to maintain static postural balance while executing dynamic activities, which made up of 67% and the remains 33% was made up of other factors like muscle tone and muscle force.

Though the PBS measures standing balance, it has been seen to be highly correlated with measures of trunk control. Trunk control and balance are essential elements of the functional abilities of children with CP. A study by Panibatla S et al has shown that the static sitting balance, dynamic sitting balance and dynamic reaching as measured by Trunk Control Measurement Scale strongly correlated with the scores of PBS. Because of this relationship between standing balance and trunk control, which is essential for a good score on QUEST, this study chose to correlate PBS and QUEST scores.

According to neuro-developmental principles, movements of extremities are controlled in proximodistal fashion with the trunk. Reaching distance seems to be a crucial factor in choosing a movement strategy for both healthy persons and children with CP. The arm, hand, and trunk are programmed together in a fixed temporal order during the reaching movement to assist transporting the hand to the target in a precise way.

Balance and upright postural control are fundamental components of movement which plays a major role in maintaining the body in equilibrium. Postural control development during early life is a complex and long term process. During this process of development, the postural control mechanism provides a vertical posture of stabilizing head and trunk against gravity to allow a proper base for performing adequate activities like sitting, reaching, standing and walking. The trunk plays a key role in maintaining the postural control mechanism and also in the organization of balance reactions in this developmental process. The trunk control is also required for a stable base of support which is necessary to execute functional activities for limb movements.

PBS is easy and may be a less expensive alternative to be used in clinical practice. It is a reliable and valid tool for children with CP and can be used to evaluate balance and detect small changes in their functional balance.

The QUEST groups upper limb movement into four domains. Each domain focuses on areas of difficulty typically seen in children with spastic cerebral palsy: (a) Dissociated Movements, it measures ability to voluntarily isolate movement at the shoulder, elbow, wrist and fingers; (b) Grasps, which measures grasp function also rates sitting postures during grasps of 1 inch cube, cereal, pencil or crayon; (c) Weight Bearing, in this domain evaluate the ability to lean on the arms in prone or 4-point kneeling and sitting; and (d) Protective Extension evaluates using the arms to stop oneself from falling forward, backward and to the side. In addition to the four domains of movement the QUEST also has three scales: Hand Function, Spasticity and Cooperativeness. However this scale does not measure certain aspects of hand function like grip strength, and that has been quoted as a limitation of its utility.

Trunk control and balance are essential elements of the functional abilities of children with CP. The ability to perform functional activities is dependent on the stability of the trunk to carry out the movements of upper and lower extremities. This is then leads to the relationship of dynamic balance and upper limb function, as demonstrated by the present study. Therefore, it can be assumed that trunk targeted interventions for improvement of trunk stability increases gross motor function and thus performance on PBS as well as upper limb functions.

LIMITATIONS

The current study had the following limitations,
namely, a relatively small sample size and lack of homogeneity of the sample, since we have included different topographical groups. The QUEST is a good outcome measure for evaluate upper limb function, but it is not sufficient to examine whole upper limb function such as hand grip strength. Functional balance was assessed using PBS which includes more of standing activities and lack trunk control measure components. The study only measured the relationship of upper limb function and functional balance at a given point of time. Further studies should examine the effect of interventions improving dynamic balance on upper limb function in similar populations.

**CONCLUSION**

Findings of this study showed that there is a strong positive relationship between upper limb function and functional balance. Interventions to improve trunk control and balance may improve performance of upper limb function measures. Further studies are required to determine the influence of balance function on upper limb function.

**Conflict of Interest:** The authors agree that there was no conflict of interest.

**Source of Funding:** No external source of funding was utilized for the study.

**Ethical Clearance:** Ethical clearance was obtained from Institutional Ethical Committee of AJ Institute of Medical Sciences And Research Centre.

**REFERENCES**

Differences in Speed, Agility and Vertical Jump among Athletes of Various Sports

Oves Patni1, Viraj Dhaduk2, Fenil Jariwala2, Parinda Patel2, Hiral Hadiya2
1Lecturer, 2Internship Student, Sarvajanik College of Physiotherapy, Rampura, Surat

ABSTRACT

Background: An Athlete is defined as a person who is proficient in sports and other forms of physical exercise. Athletes’ heart rates are somewhat lesser than the sedentary person. Changes in various parameters are observed in athletes of various sports.

Aims and Objectives: Primary aim of the study was to identify and compare the values of the speed, agility and Vertical Jump Test among players of various sports.

Methodology: 60 yard shuttle run test, Illinois Agility Test, Sargent Jump Test were applied on 100 male players of age 18-25 years have been selected from cricket, football, kabaddi, basketball from various institutes of Surat city; who have at least played till district level. Analysis was done using multiple variables ANOVA.

Conclusion: By the results of this study it can be concluded that major difference exist in parameters of agility and vertical jump among various sports players, while no significant difference has been found in speed. Kabaddi and cricket players have been shown to have greater level of agility, while basketball and football players have been shown greater level of vertical jump, which is in line with the nature of their sports.

Keywords: agility, speed, vertical jump, basketball, cricket, football, kabaddi

INTRODUCTION

An athlete is defined as a person who is proficient in sports and other forms of physical exercise. A person who takes part in competitive athletic track and field events can also be described as an athlete. There are physiological differences between normal individual and athletes.

Adaptation in neural regulation of muscle with regard to recruitment of motor units and improvement in muscle power can be seen by strength training. Presence of various functional neuromuscular systems in athletes, who are engaged in sports which demand rapid and intense contractions of muscle, is more compared to non-athletes1.

Body composition plays a vital role on performance of athletes. However, proportion of the body composition also provides information about various adaptive changes of athlete’s physical training protocol2.

Hemodynamic changes and normal physiology of heart depend upon the physical activity. More demanding activity shoots blood pressure along with cardiac output and heart rate, which load heart. Body composition of normal individual and athlete vary even though their height and weight are same. Athletes who are playing dynamic games, which has both aerobic as well as anaerobic exercise have lean body built and less fat. They have more muscular left ventricular wall and internal diameter than normal person3. This type of training improves bone mineral density by depleting more minerals to the area of skeleton which experience more stress4. Acute exercises alter the blood supply to every tissue in the body.

Average resting heart rate of sedentary person lieu 60-80 beats/min, when 28-40 beats/min for intensely trained athlete. Parasympathetic tone is responsible for this change, which is accompanied by endurance training, till near maximal level of exercise not reach, heart rate
is closely relate to intensity of exercise, then heart rate remains plateau even exercise workload increase.

To match demands of exercise, stroke volume also changes during acute stage. Most researchers agree that rise in the stroke volume is equal to exercise intensity till it reach 40%-60% of VO\textsubscript{2max}. Stroke volume also altered with body position, it becomes two fold in standing than supine. For example, 60ml/beat – 80 ml/beat stroke volume at rest in untrained individual can reach up to 110ml/ beat - 130ml/beat with maximal exercise. When 80ml/beat – 110ml/beat stroke volume at rest reach up to 160ml/beat-200ml/beat with maximal exercise in trained athletes.

Increase in the cardiac output is direct proportion to increase in intensity of exercise. A normal value of cardiac output is approximately near 5 lit/minute, but it can vary according to size of the person. Maximal cardiac output in sedentary person can reach up to 20litre/minute, which is up to 40litre/minute in elite endurance athlete.

Blood pressure is closely related to exercise intensity, during endurance exercise systolic blood pressure increase with increase in exercise intensity. However, there is no significant change in diastolic pressure. With maximal exercise, 120mmHg resting blood pressure in normal person can shoot up to 200mmHg, which is 240mmHg-250mmHg have been recorded for the elite athlete.

Body get aid of additional blood flow through raised cardiac output and blood pressure. These responses along with Action of sympathetic nervous system on the local arterioles transport blood to the areas which demand more blood than less needed areas, such as working large group of muscles. In resting condition, muscle receives only 15% - 20% of cardiac output, which is 80%-85% in high intensity exercise.

Maximum pulmonary pressure of untrained person, 100-120 litre/minute at resting can increase up to or beyond 130-150 litre/minute with endurance training. Maximum pulmonary ventilation rate can go up to 180litre/minute in normal athlete and 200 litre/minute in highly trained endurance exercise.

Pulmonary diffusion increase with exercise intensity after maximal level, other than it is unchanged.

Capillary numbers vary with adaptation to aerobic training. This adaptation leads to 15% more capillaries in elite athlete, who have under gone for aerobic training for prolong period of time., it help in various functions such as better gas, nutrition, heat, metabolic by products removal from muscle which is contracting. 70%-80% more muscle myoglobin content is found in trained athlete. This additional myoglobin rise oxidative metabolism capacity of the muscle after the training.

Aerobic changes also induce cellular changes. Muscle fibre’s ATP generation capacity improves because of change in mitochondrial function. Simultaneously there is alteration in size; there is 35% growth in mitochondria’s dimension.

Though proper training, one can reduce depletion of lactic acid in the blood and can perform exercise at higher percentage of one’s VO\textsubscript{2max}. This can be understand easily with example of trained marathon runner who can sustain his race with pace of 70%-75% of his VO\textsubscript{2max}, where there is continuous accumulation of lactate in blood in untrained fellow. The respiratory exchange ratio reflects the element, which is used as a fuel source to get the energy. After proper training, there is reduction in RER values. Following by training body use freer fatty acid than carbohydrate.

There are some differences in among the cricket, football, basketball and kabaddi. Cricket is overhead ball throwing activity, which two key elements: first is throwing speed and second is throwing accuracy. In cricket for better performance player should have better execution of overhead throws.

Key elements in basketball are endurance, strength, speed and player’s mobility. These are the basic driving need of the game. It also requires explosiveness and duration sort of skills; to perform jump, shot, pass. Basketball demands some special physical qualities such as acceleration ability, initial speed and kinetic dynamic player.

Kabaddi is an Indian game and vary popular in Asian countries. In this game player should have good protective as well good attacking skill. Tracing path, foot work, attacking strategy, good returning skill and some pre-consideration of raid these are some of the abilities which required in kabaddi player.

Another international and most popular sport is
football. It is the most complex and highly competitive game played worldwide. It is considered as a top sport for the reaching exercise⁹.

In the Illinois Agility Test athletes have asked to lie down with head toward the path and face toward the ground, with the sound of whistle players started running along the pathway which was 10m×5m, where he ran around 8 cones¹⁰. In the 60 yard speed test, four cones are place in a line 5m apart from each other, player ran toward the first cone touch and came back and repeat same for other two cones. At the end of the test final measured time is noted down¹². In the Vertical Jump Test, first of all player’s height was measured after that players maximum reaching ability was measured by asking him to stand straight with fully flexed shoulder and face toward sideward. Then player had given the marker and asked him to jump as high as he can jump for three times and highest score is measured¹¹.

**METHODOLOGY**

For this study trained male athletes of cricket, basketball, football, kabaddi, whose age are between 18-25 and who were engaged in only one sport at least up to district level were selected . For data multiple institutes like Sardar Vallabhbhai National Institute Of Technology, Botawala Hostel, Surat Municipal Corporation Sports Complex, M.T.B. Arts College, and Rajhans Elight were included. First of all we have contacted all the captains’ of the teams and then we have met the coaches. Consent forms were signed by the players, in which their privacy rights were assured. At the ground, field for testing was prepared with the help of cone, land markers and measuring tapes. Whole procedure of tests was explained to the players like initiation, precautions of tests & test termination. Test readings were recorded in one trial, no one was allowed to attend test second time. In the Illinois Agility Test athletes have asked to lie down with head toward the path and face toward the ground, with the sound of whistle players started running along the pathway which was 10m×5m, where he ran around 8 cones. In the 60 yard speed test, four cones are place in a line 5m apart from each other, player ran toward the first cone touch and came back and repeat same for other two cones. At the end of the test final measured time is noted down. In the Vertical Jump Test, first of all player’s height was measured after that players maximum reaching ability was measured by asking him to stand straight with fully flexed shoulder and face toward sideward. Then player had given the marker and asked him to jump as high as he can jump for three times and highest score is measured.

**STATISTICAL ANALYSIS**

<table>
<thead>
<tr>
<th>Table 1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>Basketball</td>
</tr>
<tr>
<td>Kabaddi</td>
</tr>
<tr>
<td>Valid Cricket</td>
</tr>
<tr>
<td>Football</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>WEIGHT</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
**CONT... Table 2**

<table>
<thead>
<tr>
<th>Test</th>
<th>Between Groups</th>
<th>Within Groups</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HEIGHT</strong></td>
<td>145.640</td>
<td>3</td>
<td>48.547</td>
</tr>
<tr>
<td></td>
<td>3639.200</td>
<td>96</td>
<td>37.908</td>
</tr>
<tr>
<td></td>
<td>3784.840</td>
<td>99</td>
<td></td>
</tr>
<tr>
<td><strong>60 Yard Shuttle Test</strong></td>
<td>3.123</td>
<td>3</td>
<td>1.041</td>
</tr>
<tr>
<td></td>
<td>47.822</td>
<td>96</td>
<td>.498</td>
</tr>
<tr>
<td></td>
<td>50.945</td>
<td>99</td>
<td></td>
</tr>
<tr>
<td><strong>ILLINOIS AGILITY TEST</strong></td>
<td>47.053</td>
<td>3</td>
<td>15.684</td>
</tr>
<tr>
<td></td>
<td>243.935</td>
<td>96</td>
<td>2.541</td>
</tr>
<tr>
<td></td>
<td>290.987</td>
<td>99</td>
<td></td>
</tr>
<tr>
<td><strong>VERTICAL JUMP TEST</strong></td>
<td>747.950</td>
<td>3</td>
<td>249.317</td>
</tr>
<tr>
<td></td>
<td>6287.040</td>
<td>96</td>
<td>65.490</td>
</tr>
<tr>
<td></td>
<td>7034.990</td>
<td>99</td>
<td></td>
</tr>
</tbody>
</table>

**DISCUSSION**

Various studies suggest difference in speed, agility, vertical jump and strength in basketball players of various ages and genders\(^7\),\(^14\),\(^15\),\(^16\). Also changes in anaerobic capacity have been found in American football players\(^17\).

While changes in players of the same sport have been studied, differences among players of various sports have not been focused on.

For the purpose of this study a 100 athletes who had played at least at district level in the aforementioned...
sports were selected from various institutes. 25 players were grouped according to their individual sport and thus four groups were created for basketball, kabaddi, cricket and football (Table: 1).

Mean and standard error were determined for parameters of height, weight, speed using 60 Yard Shuttle Test, agility using Illinois Agility Test and vertical jump using sergeant jump test. Mean values of speed show minor differences among various sports, while mean values of agility and vertical jump show significant difference (Table: 2).

Differences in cardiac structure and function and bone density has been found among various sports athletes. Also differences in throwing speed and accuracy among basketball and cricket players have been studied.

For the purpose of study differences within groups and between groups ANOVA was applied. The results of ANOVA suggest significance values of 0.001 between groups in Illinois Agility Test, which suggest a major significant difference in agility among various sport. The significance value for vertical jump is 0.013, which suggest a major difference in vertical jumping capability in various sports. The significance value between groups for parameter of speed has been found to be 0.107, which suggest no major difference in speed among various sports groups.

Chart: 1 suggests the result of Illinois Agility Test, which suggest high level of agility among kabaddi and cricket players with lowest level of agility found among football players. Chart: 2 suggest the result of sergeant jump test, with basketball and football players having the highest amount of vertical jump and cricket players were having the lowest. Chart: 3 suggest the result of 60 Yard Shuttle Test, which suggest a mean difference of 0.2 among players of various sports.

CONCLUSION

By the results of this study it can be concluded that major difference exist in parameters of agility and vertical jump among various sports players, while no significant difference has been found in speed. Kabaddi and cricket players have been shown to have greater level of agility, while basketball and football players have been shown greater level of vertical jump, which is in line with the nature of their sports.

Conflict of Interest : Nil

Source of Funding : Self Funded

REFERENCES


Comparison between Effectiveness of Active Release Technique and Capsular Stretch Along with Conventional Therapy in the Management of Frozen Shoulder

Saurav Singh Kushwah¹, Namrata Srivastava²
¹Assistant Professor, ²Assistant HOD, Department of Physiotherapy, Career College, Bhopal

ABSTRACT

Objective: To compare the effectiveness of active release technique and capsular stretch along with conventional therapy in patients with frozen shoulder

Study Design: Experimental study design.

Subjects: 30 patients between the age group 40 yrs to 60 yrs having frozen shoulder were selected as per the inclusion and exclusion criterion.

Procedure: Using random sampling method the 30 subjects were divided into 2 equal groups with 15 patients each and treated with active release technique and capsular stretch along with conventional therapy and capsular stretch with conventional therapy. 18 sessions over a period of 5 weeks. Outcomes scores were evaluated using goniometer and VAS scale.

Result: Subjects receiving active release technique and capsular stretch along with conventional therapy showed significant reductions in pain and other symptoms with an improvement in quality of life.

Conclusion: Active release technique and capsular stretch with conventional therapy is more effective in increasing ROM and decreasing pain of frozen shoulder rather alone capsular stretch with conventional therapy. These changes are clinically significant.

Keywords: ART, Capsular stretch, frozen shoulder, Plantar fascitis, Intophororesis, US, FFI

INTRODUCTION

Adhesive capsulitis is characterised by insidious and progressive onset of pain and loss of active and passive mobility of glenohumeral joint. The term adhesive capsulitis, or periarthritis of shoulder are used at times with meaning synonymous with frozen shoulder. The term frozen shoulder was coined by Codmann in 1934 although it was described as late as 1975 by Duplay. Thereafter Neviaser noted that the pathology of this condition was actually located in the capsule of the shoulder joint and therefore called it ‘adhesive capsulitis’. He found dense adhesions and capsular contractures causing restriction of motion, intraarticular pain, and microscopic evidence of reparative inflammatory changes in the glenohumeral joint capsule.[5] A stiff and painful shoulder is often casually labeled as a frozen shoulder. The incidence of frozen shoulder has been estimated to be from 3-5% in general population with a significant incidence amongst diabetics in order of 10-20%. It appears to be most common in adults between the age group of 40-70yrs. Women are at a greater risk (4:1) and non-dominant arm is most commonly affected. Idiopathic frozen shoulder is most commonly associated with diabetes mellitus.[6,7,8,9]

Frozen shoulder presents mainly with two characteristics: pain and contracture. All gross ranges of motions are greatly decreased, and pain is felt in all directions. This tends to be due to scar tissue build up that occurs from non-use. Restricted glenohumeral elevation and external rotation, together with unremarkable radiographic findings, are also observed.[38] Conservative management remains the mainstay treatment of adhesive
capsulitis. This includes therapeutic modalities, mobilization, exercise, soft tissue therapy, chiropractic manipulation of the shoulder, non-steroidal anti-inflammatory drugs, and steroid injections.

Physiotherapy management aims to relieve pain, promote healing, reduce muscle spasm, increase joint range of motion and strengthen weakened muscles and ultimately to prevent and treat functional impairment (Green et al 2003; 2009). These include: heat or ice applications; Ultrasound; Interferential therapy; Transcutaneous Electrical Nerve Stimulation (TENS); pulsed electromagnetic field therapy; active and passive ROM exercises; Proprioceptive Neuromuscular Facilitation (PNF) techniques; manual physical therapy and laser therapy. Active release technique is also one of the treatment options considered now a days by many health practitioners for the treatment of frozen shoulder. Active release technique helps to break the adhesions formed around the shoulder joint. It also releases and stretches the connective tissue around the shoulder, restores vascular and lymphic circulation, and increases the range of motion.

Many combination of treatments have been used in the past for the treatment of adhesive capsulitis and they have been found to be effective. But no studies have been done in the past to compare the combined effectiveness of Active release technique along with capsular stretch in patients with Adhesive capsulitis and their effectiveness in reducing pain, increasing joint mobility and functional activities.

**METHODOLOGY**

**Study Design:**
Experimental Design

**Sampling method:**
Random Sampling

**Study Centre:**
Career Institute of Medical Sciences

**Sample:**
30 frozen shoulder subjects age between 40-60 years volunteered to participate in the study. They were randomly divided into 2 groups; Group A (Experimental) and Group B (Control) with each group having 15 subjects.

**Inclusion Criterion:**
- Patient having painful stiff shoulder at least for 3 months
- Age group between 40-60 years.
- Both males and females.
- Limited range of motion of shoulder joint that is ROM compare to non involved side
- Inability to lie on affected shoulder
- Diagnosed primary idiopathic periarthritis shoulder

**Exclusion Criterion:**
- History of surgery on the particular shoulder.
- Rotator cuff rupture.
- Painful stiff shoulder after a serious trauma.
- Fracture of the shoulder complex.
- Presence of osteoarthritis, or signs of bony damage.
- Inflammatory diseases such as rheumatoid arthritis.
- Tendon calcification.
- Patients with diabetes mellitus.

**Instrument-**
1. Treatment table
2. Towels
3. Hot pack
4. Goniometer
5. Wand

**Procedure:**
Subjects who fulfilled the inclusion and exclusion criteria were included in the study and an informed consent was taken from each of the subjects prior to participation. This was followed by Subjective as well as Objective assessment; pain assessment in terms of the Visual Analog Scale (VAS) and Functional assessment based on goniometric measurements was carried out. Instructions were given to the subjects about techniques performed.

**Group A (Experimental group):** Participants were treated with capsular stretch and active release technique followed by conventional treatment (hot pack & exercise).
1. **Capsular Stretch:** Subjects are first applied with hot pack for 20 minutes before starting the capsular stretches\textsuperscript{[11,13]}

**Anterior Capsule:**

- **Position of patient:** The subject is positioned either in side lying with the affected arm upwards or in high sitting.

- **Position of therapist:** Facing the affected joint

- **Application:** The shoulder and arms is brought backwards into extension and this stretch is maintained for a minimum of 30 seconds and maximum duration up to the point of pain experienced by the patient.

**Posterior Capsule:**

- **Position of patient:** Supine lying position or in high sitting.

- **Position of therapist:** Facing the affected joint

- **Application:** The therapist will perform cross body adduction of the shoulder and this stretch is maintained for a minimum of 30 seconds and maximum duration up to the point of pain experienced by the patient.

**Antero-inferior capsule:**

- **Position of patient:** Supine lying position or in high sitting.

- **Position of therapist:** Facing the affected joint

- **Application:** To stretch the antero inferior capsule the affected arm is taken towards the extreme of attainable elevation and counter pressure is maintained at the patient’s sternum to prevent spinal extension.

Each stress is gentle but firm and will not be released until pain rather than discomfort is experienced. Patients will receive capsular stretching of 5 repetitions per set, 5 sets per session, 1 session per day for initially 4 days and then 3 days per weeks till 5 weeks.\textsuperscript{[12]}

2. **ART Procedure:**

- **Position of patient:** Supine lying position or in high sitting.

- **Position of therapist:** Facing the affected joint

- **Application:** The therapist will first passively slightly abduct the supine patient’s humerus and will place the flat of his/her thumb on the coracobrachialis, following it just before the coracoid process. At this point, the therapist will slide off the tendon medially onto the anterior capsule. A firm tension is maintained on the capsule as the humerus is slowly abducted and externally rotated. If no spasm is created, whenever possible active movements are done, the patient will actively abduct and externally rotate the shoulder while the therapist maintains the tension.

- **Frequency:** Alternate days: For 8 sessions with each session of ART for 8 -10 mins \textsuperscript{[59]}

**EXERCISES**

The following exercises should be done 5 repetitions per set, 5 sets per session, 1 session per day for initially 4 days and then 3 days per weeks till 5 weeks.

1. Sit or stand with good posture. Keeping face forward, tip ear towards shoulder.

   Hold for 10 seconds. Repeat to other side.

2. Sit or stand with good posture.

   Turn head to one side then the other. Hold for 10 seconds.

3. Assume upright posture with shoulders relaxed.

   Move affected shoulder blade down and towards opposite hip.

4. Sitting, arms crossed at shoulder height. Turn to right.

   Hold for 10 seconds. Turn to left and hold. Repeat 10 times.

5. Sit in a chair with pulley assembled as shown. Raise the affected arm overhead pulling down on the pulley with the other hand so that you feel a stretch. with hot pack for 10 minutes before starting the capsular stretches \textsuperscript{[56,57]}

Each stress is gentle but firm and will not be released until pain rather than discomfort is experienced. Patients will receive capsular stretching of 5 repetitions per set, 5 sets per session, 1 session per day for 4 days a week for
3 week and then 3 times a week for 2 week.[58]

TREATMENT SESSION: - Treatment protocol: The treatment frequency was initially 4 times a week for 3 weeks and then 3 times a week for 2 weeks and re-exam was performed at the end of 5 weeks and revealed the following by VAS & Goniometer score at rest. Total 18 session

Outcome Measures:
The two outcome measures used are:-

a) VAS (Visual Analog Scale)
b) ROM

STATISTICAL ANALYSIS

Statistical analysis was performed by SPSS (Version 20) for Windows Alpha Value (p value) will be set as 0.05. The investigator firstly evaluated the Descriptive Statistics using Mean and Standard Deviation along with T value for the baseline characteristics. The value of t-test taken as t-paired test was used with in a group. Independed t-test was used between the group.

RESULT

Table-1: Comparison between pre test scores of experimental and control group using VAS scale.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Pre Group A Mean ± SD</th>
<th>Pre Group B Mean ± SD</th>
<th>T value</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vas</td>
<td>7.26±1.27</td>
<td>7.20±1.14</td>
<td>0.15</td>
<td>0.827</td>
</tr>
</tbody>
</table>

Table-2: Comparison between post test score of experimental and control group using VAS scale.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Post Group A Mean ± SD</th>
<th>Post Group B Mean ± SD</th>
<th>T value</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vas</td>
<td>3.2±1.01</td>
<td>4.33±1.39</td>
<td>2.54</td>
<td>0.002</td>
</tr>
</tbody>
</table>

Table-3: Comparison between pre test score of experimental and control group and experimental group using goniometer.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Experimental A group A Mean ± SD</th>
<th>Control Group B Mean ± SD</th>
<th>T value</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flexion</td>
<td>107.06±19.06</td>
<td>107.73±16.98</td>
<td>0.10</td>
<td>0.653</td>
</tr>
<tr>
<td>Extension</td>
<td>39.73±3.99</td>
<td>39.26±3.95</td>
<td>0.32</td>
<td>0.169</td>
</tr>
<tr>
<td>IR</td>
<td>47.00±5.87</td>
<td>47.33±5.76</td>
<td>0.15</td>
<td>0.173</td>
</tr>
<tr>
<td>ER</td>
<td>51.60±6.03</td>
<td>51.86±5.96</td>
<td>0.12</td>
<td>0.262</td>
</tr>
<tr>
<td>Abduction</td>
<td>105.8±12.49</td>
<td>105.93±12.11</td>
<td>0.029</td>
<td>0.582</td>
</tr>
</tbody>
</table>

Table-4: Comparison between post test score of experimental and control group and experimental group using goniometer.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Experimental group A Mean ± SD</th>
<th>Control Group B Mean ± SD</th>
<th>T value</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>flexion</td>
<td>122.86±16.20</td>
<td>118.66±14.19</td>
<td>0.755</td>
<td>0.014</td>
</tr>
<tr>
<td>extension</td>
<td>47.06±4.63</td>
<td>44.73±4.19</td>
<td>1.44</td>
<td>0.019</td>
</tr>
<tr>
<td>IR</td>
<td>57.53±5.62</td>
<td>55.46±5.97</td>
<td>0.975</td>
<td>0.0001</td>
</tr>
<tr>
<td>ER</td>
<td>63.93±4.92</td>
<td>60.26±5.61</td>
<td>1.90</td>
<td>0.0001</td>
</tr>
<tr>
<td>Abduction</td>
<td>121.86±14.39</td>
<td>117.33±10.43</td>
<td>0.987</td>
<td>0.026</td>
</tr>
</tbody>
</table>
DISCUSSION

The purpose of the study was to evaluate the effectiveness of Capsular stretch and Active release technique along with conventional therapy, as compared to capsular stretch and conventional therapy alone in subjects with adhesive capsulitis. Active release technique was developed refined and patented by Dr. Michael Leahy; it is a patented, advanced movement based massage technique method to treat problems in the soft tissues of the body, including the muscles, ligaments, fascia, and nerves. It is designed to identify and treat scar tissue adhesions that are interfering with the normal function of the body. It is a collection of soft tissue techniques for examination, diagnosis, and treatment of soft tissue disorders. It separates, releases, and stretches the connective tissue adhesions, restores vascular and lymphic circulation, and increases range of motion, flexibility. [28,29]

Baseline data of Demographic data and outcome variable did not show because significant difference in patient population.

Descriptive Statistics were used for outcome variables i.e. VAS and Goniometer. For Group A Pre VAS Score was 7.26 following treatment the Post test score was 3.2 and was statistically significant with p-value <0.0001. Also Pre goniometer Score for flexion was 107.06 following treatment the post score was 122.86 and was statistically significant with p-value <0.0001. Pre goniometer score for was extension 39.73 following treatment the post score was 47.06 and was statistically significant with p-value <0.0001; Pre goniometer score for internal rotation was 47.00 following treatment the post score was 57.33 and was statistically significant with p-value <0.0001; Pre goniometer score for external rotation was 51.60 following treatment the post score was 63.93 and was statistically significant with p-value <0.0001; Pre goniometer score for abduction was 105.80 following treatment the post score was 121.86 and was statistically significant with p-value <0.0001;

The significant difference was seen in goniometer scores in Group A due to combined usage of capsular stretch, as it mainly focuses to stretch the contracted, thickened and closely adherent capsule to the humeral head contributing to limitation of movements[32], and also using ART technique to identify and treat scar tissue adhesions that are interfering with the normal function of the body[28,29]. M.A.Harrast, Anita G.Rao (2004) suggests that capsular stretch helps maintaining and regaining range of motion in frozen shoulder. The basis of stretching of shoulder joint capsule includes forward flexion, internal rotation, external rotation, adduction and abduction.[54] James K. Mantone, Wayne Z. Burkhead Jr. & Joseph Noonan (2000), have documented the importance of stretching exercises for the anterior, posterior and inferior shoulder capsule to improve the joint range of motion in stiff shoulder.[55] ART, is effective in the treatment of adhesive Capsulitis[61] and also conditions including Overuse Syndromes [28], Chronic Tendoachillis Tendinopathy[62], etc.

Active release therapy, a soft tissue treatment, appears promising. [28] Therefore there is further more requirement of research involving randomized control trials that will more conclusively determine the efficacy of ART.

However, none of the reviews have focused specifically upon the combined effect of capsular stretch and active release technique on adhesive capsulitis. So this study mainly focuses on the combined effect of capsular stretch and Active release technique on adhesive capsulitis.

The significant decrease in VAS for both the groups was also due to usage of conventional therapy (hot pack exercise). However on comparison between both the groups; Group A Post Mean VAS Score was 3.20 and Also for Group B Post Mean VAS is 4.33 and was statistically significant with p-value <0.002. Further post goniometer Score for group A flexion was 122.86 and for group B the post score was 118.66 and was statistically not significant with p-value >0.014. Post goniometer score for group A extension was 47.06 and for group B the post score was 44.73 and was statistically significant with p-value <0.019; Post goniometer score for group A internal rotation was 57.53 and for group B the post score was 55.46 and was statistically not significant with p-value >0.0001; Post goniometer score for group A external rotation was 63.93 and for group B the post score was 60.26 and was statistically not significant with p-value >0.026; The scores of VAS and goniometer have statistically reduced in both the groups post treatment, but when compared in between the groups, the scores...
of VAS have statistically reduced in both the groups post treatment, but statistical difference in goniometer between the groups varied. The goniometric scores of extension and adduction statistically showed significant reduction in both the groups post treatment. However, goniometric scores of flexion, internal rotation, external rotation and abduction, statistically did not show any significant difference in between the groups post treatment.

Hence our study shows that the combined effect of capsular stretch and ART along with conventional therapy is equally effective in comparison to the effectiveness of capsular stretch only along with conventional therapy for the treatment of adhesive capsulitis. The majority of adhesive capsulitis responded well to both, the combined effect of capsular stretch and ART along with conventional therapy as well as capsular stretch alone with conventional therapy.

**CONCLUSION**

The results show significant improvement in both the Groups for VAS and ROM. But when compared between groups, there was significant difference between Group A and Group B in reducing pain, improving function and range of motion in frozen shoulder. Hence, this study does show more significant difference in the combined effect of capsular stretch and active release technique along with conventional therapy, than capsular stretch only, along with conventional therapy in the treatment of frozen shoulder.

**Conflict of Interest/ Source of Funding- Nil**

**Ethical Clearence:** We certify that this study involving human subjects is in accordance with the regulations stated by ethical committee

**REFERENCES**

Parental Stress and Compliance with Home Exercise Program of Children with Developmental Delay – A Correlation

Jyoti Jeevannavar¹, Akshata Madinkar², Santosh Jeevannavar³

¹Associate Professor, ²Post graduate Student SDM College of Physiotherapy, Dharwad, Karnataka, India
³Professor of Orthopaedics, SDM Medical College, Dharwad, Karnataka, India

ABSTRACT

Background: The role of parents has changed from a passive one into an active participating one. Research has shown that parental involvement and the practice of incorporating home therapy programs have increased the child outcomes over the past decades. Studies suggest that parents of children with developmental disabilities usually experience high levels of stress. The stress levels of the caregivers, if not addressed, compliance with therapy may suffer.

Objectives: To determine a correlation between caregiver stress and compliance with home exercise programs in children with developmental delays.

Materials & Method: Parents / caregivers of 100 children were given the Short Form of the Questionnaire on Resources and Stress to assess the level of stress experienced by the parents / caregivers. A Compliance Survey Questionnaire to check their compliance with therapy was also given. Duly filled forms were collected back and data was subjected to statistical analysis.

Results: Results indicated that, invariably all the parents of children with developmental delays experienced increased stress levels. Results show that an increased level of stress among parents/caregivers led to a significant decreased compliance with home exercise programs.

Conclusion: When establishing a home exercise program, therapists may need to consider the caregiver’s needs as well as their day-to-day stresses to maximise compliance with home program and achieve the best possible outcomes.

Keywords: Stress; Children; Developmental delay; Parents/Caregivers; Compliance.

INTRODUCTION

Developmental delay refers to when a child’s development lags behind established normal ranges for his or her age.¹ At least 8 percent of all children from birth to six years have developmental problems and delays in one or more areas of development.¹,²

The most important thing a parent can do for a delayed child is provide a loving and stimulating environment. The goal of treatment is to maximise abilities while preventing new problems as much as is possible.³ In current practice of physical therapy for children with physical disabilities, more and more attention is paid to parental participation.⁴ The role of parents has changed from a passive one into an active participating one.⁴

Research has shown that parental involvement improves the child’s outcomes, and the practice of incorporating home therapy programs has increased over the past few decades.⁵

Corresponding author:
Dr. Santosh Jeevannavar
Professor, S. D. M. College of Medical Sciences and Hospital, Dharwad, Karnataka, India.
Phone number: 9845549427
E mail: drssj99@gmail.com
Parents of children with physical disabilities are reported to have high levels of care taking burdens. Mothers would report increased levels of parenting stress when their children had low motor ability. Studies suggest that parents of children with developmental disabilities often experience deleteriously high levels of stress.

The physical and psychological health of caregivers was strongly influenced by the caregiving demands. Caregiving demands contributed directly to both psychological and physical health of the caregivers. The practical day-to-day needs of the child created challenges for parents.

Study indicates that, as parent and family problems increased, compliance with home exercise programs decreased. When establishing a home exercise program, physical therapists may need to consider the caregiver’s needs as well as his or her day-to-day stresses to achieve the best possible outcomes. If physical therapists do not address the stress levels of the caregiver’s, compliance with therapy may suffer.

Caring for a child with physical disabilities requires an inordinate amount of time and energy. These enormous demands coupled with the demands that exist in daily life contribute to high stress levels. Interaction with parents / caregivers of a developmentally delayed child, indicates that parents / caregivers come across many stressful situations due to the developmentally delayed child. Many studies have been done to know the efficacy of home treatment techniques in various developmental delays.

**METHODOLOGY**

Ethical clearance was obtained from the Institutional Ethical Committee. Parents of all the children with developmental delay, referred to the Paediatric Physiotherapy OPD were informed about the need and purpose of the study.

**Study Design:** Cross sectional study

**Inclusion Criteria:**

Parents / Caregivers of children 3 months to 16 years (192 months) of age with developmental delay who had been instructed a home based exercise program

**Exclusion Criteria:**

Parents unwilling to participate in the study.

**Materials used:**

1) Short Form of the Questionnaire on Resources and Stress (SFQRS) - Questionnaire to assess the level of stress experienced by the parents.

2) Compliance Survey Questionnaire - A self generated survey form to check the parent’s compliance with therapy. The purpose of these questions was to determine the level of compliance with the child’s prescribed home exercise program. The level of compliance, termed the compliance score, was determined by comparing how often the caregiver was instructed to follow the home program with how often they reported following the home program.

**Procedures:**

143 children with developmental delay were referred for physiotherapy during the study period. 47 parents did not agree for participation in the study. Thus a written informed consent was obtained from 96 parents and forms of the SFQRS and the Compliance Survey Form were handed over for being duly filled and returned. 90 parents returned the forms with a response rate of 94%. After collection the forms were screened for completeness. 9 forms were discarded due to incomplete answers and data of 81 forms was then subjected to statistical analysis.

**RESULTS**

Data collected from 81 forms was analysed using the Statistical Package for the Social Sciences (SPSS) version 23.

The children included in the study consisted of 31 (38.27%) girls and 50 (61.73%) boys. The Z-score for population proportion was -2.99 and p-value was 0.003. The result was significant at p<0.05. The proportion of boys was significantly higher than the girls. The mean age of the children included in the study was 74.15 (±56.34) months. The parents who participated in the study included 62 (76.54%) mothers and 19 (23.46%) fathers. The Z-score for population proportion was 6.9 and p-value was <0.0001. The result was significant at p<0.05. The proportion of mothers as primary caregivers was significantly higher than the fathers, with mean
SFQRS scores of 25 and 27 respectively. The stress scores of mothers and fathers did not differ significantly. The mean SFQRS score of parents for this sample was 25.46 (±5.99).

The minimum and maximum scores were 10 and 42 respectively. The scores were classified into 3 intervals based on the minimum and maximum scores and the mean and standard deviation into 10-20, 21-32 and 33-42, with being labelled as mild, moderate and severe stress respectively. The frequency distribution showed 16 (19.75%), 55 (67.9%) and 10 (12.35%) participants in each class with mean compliance of 92.63%, 73.65% and 58.5% respectively.

Pearsons correlation analysis of the level of stress and compliance was -0.8, signifying a strong negative correlation between stress and compliance i.e. as the level of parent/caregiver’s stress increased the percentage of compliance with home exercise programs (therapy) decreased.

### Table 1: Frequency distribution of parents

<table>
<thead>
<tr>
<th>SFQRS Scores</th>
<th>No. of Parents</th>
<th>Average SFQRS Scores</th>
<th>Average Compliance Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 – 20 (Mild)</td>
<td>16 (19.75%)</td>
<td>17.94 ± 2.54</td>
<td>92.63 ± 6.12</td>
</tr>
<tr>
<td>21 – 32 (Moderate)</td>
<td>55 (67.9%)</td>
<td>25.73 ± 3.54</td>
<td>73.65 ± 11.44</td>
</tr>
<tr>
<td>33 – 42 (Severe)</td>
<td>10 (12.35%)</td>
<td>36 ± 2.91</td>
<td>58.5 ± 4.48</td>
</tr>
</tbody>
</table>

**DISCUSSION**

A number of factors may contribute to the elevated stress levels that parents of children with disabilities experience, including child characteristics, such as challenging behaviours, reduced intellectual functioning, physical limitations, deficits in self-care skills and limited social skills. The data obtained from parents of 81 children was subjected to data analysis. A significant number of children were boys. This observation is supported by studies which have reported a consistently higher prevalence of cerebral palsy among males than females. The results of our study reveal elevated levels of stress in all the parents of children with developmental delays, with 67.9% of the parents scoring in the moderate range of stress and only 19.75% of them scoring in the mild stress category and 12.35% scoring in the severe stress category. The results also reveal that there is a significant statistical relationship between stress and compliance with home exercise program. These results are consistent with those of other studies examining stress experienced by parents of children with differing disabilities. Studies in the past have revealed a significant relationship between the caregivers’ level of noncompliance with the home program and their level of stress. Also a significant correlation has been established between family problems and noncompliance with home programs. Stress levels were not significantly different among mothers and fathers of the children. It has been observed that as parental stress increased, the quality of interaction with the child decreased. Studies examining the effectiveness of counselling to family caregivers have reported that counselling promoted healthier lifestyles for caregivers themselves and their disabled children.

**CONCLUSION**

When establishing a home exercise program for a child with disability, therapists may need to consider the caregiver’s need as well as their day-to-day stresses to maximise compliance with home program and achieve the best possible outcomes. An assessment of parental stress can help identify the support needs of a parent. The assessment of parental stress should become a routine part of a child’s screening and evaluation. Information obtained from an assessment of parental stress may also explain a child’s lack of progress in treatment. It may also help identify parents at risk for development of serious health problems that, if not identified and treated, could seriously hamper the parent’s ability to care for his or her child. If stress can be minimised, compliance with home exercise programs may increase. Thus, by reducing parental stress, the effectiveness of services may be enhanced and the child’s prognosis is likely to improve.
Source of Funding - Self
Conflict of Interest - Nil

REFERENCES


Effects of Scapular Taping on Pain and Disability in Mechanical Neck Pain-An Experimental Study

Suchetha P S1, Darwin Abraham2, Saumya Srivastava1
1Assistant Professor, 2Post Graduate, Nitte Institute of Physiotherapy, Nitte (deemed to be) University, Mangalore, Karnataka

ABSTRACT

Introduction: Neck pain is the second most common pain after low back pain. The lifetime prevalence of the neck pain is 22-70% in industrial countries. Onset of mechanical neck pain is generally insidious and is multifactorial in origin which includes poor posture, anxiety, depression, neck strain. The altered activation of upper trapezius and combined with weakness of scapular retractors might contribute to neck pain. Taping can be advantageous for reducing neck pain and improving neck posture by facilitation and inhibition of muscles depending upon the technique of application.

Objective: To determine the effects of scapular rigid taping on pain, tenderness and disability in mechanical neck pain.

Methodology: The Study recruited 35 patients with mechanical neck pain through purposive sampling. Pre intervention score of Visual analogue scale, pain pressure threshold and neck disability index was taken. Taping for upper trapezius and scapular retractors was given. Post outcome of visual analogue scale, pain pressure threshold and neck disability was taken at the 5th day of the treatment

Results: The scapular taping resulted in significant decrease neck disability index and VAS and increased in the pain pressure threshold. With mean difference of VAS by 6.25±1.28 to 3.82±1.12 and mean of NDI by 16.80±4.82 to 8.20. There was an increase in the pain threshold mean by 11.76±4.21 to 14.71±4.85 with p value < 0.001.

Conclusion: The present study concludes that combined rigid taping of upper trapezius and scapular retractors is effective in decreasing mechanical neck pain.

Keywords: Mechanical neck pain. Rigid scapular taping.
Postural alterations can exist at the inception of mechanical neck pain. One of the most common postural deviations is the forward head posture (FHP) which is because of the repetitive usage of computers. Scapula winging is the deficit of bony connection in the scapulothoracic region which prompts pathologic manifestation. The pressure mechanism provided by the muscular attachments of the serratus anterior, subscapularis and the ligamentous attachments at the acromioclavicular joint help in holding the scapula in proximity to the thorax.

The malposition of the scapula is caused by the altered motility patterns in the serratus anterior and upper trapezius, levator scapulae and rhomboids. The neck pain leads to the altered activity of upper trapezius and lower trapezius during upper limb task.

The structures that are involved in the musculoskeletal and neurological winged scapula are upper trapezius, serratus anterior, rhomboideus major, rhomboideus minor, levatorscapulae, pectoralisminor, spinal accessory nerve & the long thoracic nerve.

Taping facilitates and inhibits muscles depending upon the manner in which it is applied. When applied in a manner that a relatively short overactive muscle is held in a lengthened point, it will cause translation of the length tension curve to the right and lesser force evolution through decreased actin-myosin overlap during the cross-bridge cycle at the point in joint range at which the muscle is required to work. Taping is known to enhance force production of the scapula retractors by improving their length-tension relationship and effective in reducing neck and shoulder pain and in improving posture of the neck. Scapular taping was found to be effective in cervical radiculopathy and shoulder pain. However effect of scapular taping is not yet determined in mechanical neck pain. Hence this study is undertaken with the objective to determine the effects of scapular taping on mechanical neck pain, tenderness and disability.

**MATERIAL & METHOD**

The approval from the institution’s ethical committee was obtained. The subjects diagnosed with mechanical neck pain by an orthopaedician fulfilling the inclusion criteria were included in the study. An informed written consent was taken from all the subjects included in the study. A total of 52 subjects were screened and 35 subjects were included in the study through purposive sampling technique.

Subjects fulfilling the following inclusion criteria i.e. the age group of 18-35, presenting with neck pain (VAS > 3), Forward head posture, Winging of scapula medial border, Inferior angle protrusion of scapula, Positive Lennie’s test, were included in the study and subject with pain radiating to arm, trauma, fibromyalgia related neck pain, Malignancy, Intervertebral disc prolapse of neck, Nerve impingement, Neck pain with headache, Pathology of shoulder, Hyper sensitive skin, Limb length discrepancy, Structural thoracic scoliosis and kyphosis, Congenital defect of scapula, neuromuscular disorders, were excluded from the study.

**Procedure:**

Subject was positioned in sitting on a chair with back support & upper limbs are placed on the chair’s arm rest in a relaxed position. Pre intervention score of visual analogue scale, neck disability index and pain pressure threshold were recorded. Area which had to be treated was shaved and cleaned with the sterilizer. The zinc oxide tape of 4 cm was applied on upper trapezius, middle trapezius and scapular retractors by depressing and retracting the scapula.

**Taping for scapular retractors (rhomboids and lower trapezius):**

Hypo allergenic tape was laid from the coracoid process posteriorly across the lateral aspect of acromion to a point just lateral to the T7 spinous process.

Rigid tape was applied over the hypoallergenic tape, with a posterior – inferior force to bunch the upper trapezius fibers (Fig 1)
Subjects were instructed to remove the taping after 4 hours and the taping procedure was repeated everyday for 5 days. Tape was removed immediately if there was any allergic reaction such as itching or skin rashes.

Post intervention score of visual analogue scale, neck disability index and pain pressure threshold were taken at the end of 5th day.

**Statistical analysis**

Statistical analysis was carried out using SPSS 21 version. The collected information was summarized by using frequency, percentage, mean and standard deviation. To compare outcome measure before and after intervention, paired t test was used. To summarize the descriptive data such as age, gender & side of pain independent sample t test was used. The p value < 0.05 was considered as significant.

**RESULTS**

50 patients were screened of which 35 subjects (n=35, 27 female and 8 male) fulfilling inclusion criteria were included in the study. The mean age of male subjects was found to be 23.50 ± 2.87 years and mean age of female subjects was 22.18 ±1.54 years.

12 subjects had left side neck pain and 23 subjects reported neck pain on the right side.

The outcome measures used were visual analogue scale score (VAS), Neck disability index (NDI) & Pain pressure threshold (PPT). The scores were recorded on the 1st day before the intervention & on the 5th day after the intervention. To compare outcome measure before and after intervention, paired t test was used.(Table 1)

The mean of the pre visual analogue scale is 6.25 ± 1.26 and mean of post visual analogue was 3.82 ± 1.12. And “t” value obtained was 23.628. The p value found to be < 0.001.

The mean of the pre neck disability index is 16.80 ± 4.825 and mean of post neck disability was 8.20 with SD 3.19. And t value obtained was 16.223. The p value found to be < 0.001. The mean of the pre pain pressure threshold is 11.76 ± 4.21 and post mean was 14.71 with SD 4.85 and t value obtained was -6.553. The p value found to be < 0.001.

The result showed that there is statistically significant difference between the pre and post outcomes measure of VAS, NDI and PPT. Rigid taping of scapular muscles thus showed improvement on pain tenderness and disability in subjects with mechanical neck pain.
Table 1: Comparison of visual analogue scale score (VAS), Neck disability index (NDI) & Pain pressure threshold (PPT) before and after intervention

<table>
<thead>
<tr>
<th>Outcome Measure</th>
<th>MEAN</th>
<th>SD</th>
<th>t value</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre VAS</td>
<td>6.2571</td>
<td>1.2571</td>
<td>23.625</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Post VAS</td>
<td>3.828</td>
<td>1.1242</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre NDI</td>
<td>16.8</td>
<td>4.825</td>
<td>16.22</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Post NDI</td>
<td>8.2</td>
<td>3.197</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre PPT</td>
<td>11.768</td>
<td>4.218</td>
<td>-6.553</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Post PPT</td>
<td>14.710</td>
<td>4.850</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**DISCUSSION**

This study was conducted with an objective to determine the effect of scapular taping on pain, tenderness and disability in mechanical neck pain. The results of the current study demonstrated that patients with mechanical neck pain who received rigid taping for the scapular muscle exhibited statistically significant improvement in neck pain, disability and pain pressure threshold following a short time of application. Thus the alternate hypothesis was accepted with rejection of the null hypothesis.

According to this study mechanical neck pain was more commonly found in females with winged medial border and inferior angle of scapula. This finding is in line with Won-gyu Yoo (2013) who found that mechanical neck pain is more common in people between the ages of 20 to 45 years with an increased predisposition to female patients.15

The reduction in pain following the application of rigid tape can be due to inhibitory mechanisms as stated by Javier González-Iglesias (2009) in his study on effects of cervical kinesio taping on pain in patients with whiplash injury.16

Sally Wegner (2010) stated that the correction of the scapular position can decrease neck pain.13 The individual with neck pain have altered trapezius activation pattern. Suggesting that the postural correction strategy may affect the activity in the middle and lower portions of trapezius. Decrease in pain can also be rationalized due to adaption of the scapula to neutral position. This was supported by Ackermann 2002, in their study on the violinists who hold the violin between left shoulder and the chin using left upper trapezius right sternocleidomastoid and left cervical rotators. They state that application of rigid taping aids not to correct alignment of the scapula but rather helps in adaption of the scapula to neutral position.12 Another rationale to the decrease in pain may be stated by a reduced activity of the upper trapezius which is supported by David M et.al. (2007) whose study stated that scapular taping produced a significant overall decrease in upper trapezius activity and Ackermann(2002) who observed a reduction of electromyographic activity in the upper trapezius muscle following application of rigid tape for 5 days in patients which shoulder impingement syndrome.12 In this study tenderness in the neck region decreased significantly this may be due to the tension applied via the rigid tape that provided for neural feedback and decreased mechanical irritation of the soft tissue structures surrounding the neck region. Moreover rigid tape provides afferent stimulation, facilitating pain inhibitory mechanisms (gate control theory), and increased mechanical sensitization leading to decrease in pain and tenderness in the neck.14

In this study disability arising due to neck pain decreased significantly these changes are attributed to the application of rigid tape that stimulate cutaneous mechanoreceptors in skin, caused an alteration in the length tension relation and assisted in neutral postural alignment of the scapula and thus return to the head posture to neutral position there by enhancing the functions of the cervical extensor muscles. With a decrease in pain and improvement in the muscle firing level and recruitment pattern resulted in improved range of motion and decrease in the level of disability.

Increase in pain threshold is indicative of decreased pain and tenderness in the said region this can be attributed to the fact that there occurs a decrease of
generalized nociceptive hypersensitivity via treatment.\textsuperscript{17}

Strength of the study is the combined taping of upper trapezius and scapula retractors simultaneously which is simple to administer and less time consuming.

Limitation of the study: In this study there was no equal gender distribution of subjects with mechanical neck pain. No long term follow up of subjects was carried out in this study. No control group was included in this study.

Future studies can be done by separately taping upper trapezius and scapular retractors. Taping with other intervention such as MET can be used for further study.

**CONCLUSION**

The study concluded that rigid scapular taping method used in this study resulted in significant decrease pain and disability as there was decrease in neck disability index and VAS scores and increased pain pressure threshold. And hence this treatment can be used as an effective technique for individuals with mechanical neck pain.

**Conflict of Interest:** There is no conflict of interest.

**Source of Funding:** Self funded

**Ethical Clearance:** Obtained

**REFERENCES**


A Study to Analyze the Efficacy of Strength Training Exercise for Fall Related Gait Kinematics in Elderly – An Experimental Study

Rajendra Kachhwaha1, Sriraghunath S2, Arunkumar3, David Arunkumar4, Ishita Vyas5
1Principal, Narayana Hrudayalaya College of Physiotherapy, Narayana Health city, Bommasandra Industrial area, Bangalore, 2Assistant Professor, R.V. College of Physiotherapy, Bangalore, 3Assistant Professor, Narayana Hrudayalaya College of Physiotherapy, 4HOD, Physiotherapy, Vasavi hospital, Bangalore, 5Graduate Student (Physiotherapy)

ABSTRACT

Background: Prevention of falls and the associated injuries would reduce disability, improve the quality of life, and reduce the costs of health care. Consequently, developing safe, effective, and feasible multidimensional exercise programs for preventing falls in elderly. Objective To compare the effectiveness of strength and training exercise with that of Range of motion exercise in fall related gait kinematics in elderly. Methods/Design: Pre and Post experimental study, 100 subjects was taken from age group of 65 to 80 years. The sample design followed was convenient sampling with the subjects allocated randomly into 2 groups experimental(50 subjects) and control group(50 subjects). The testing protocol comprises tests for fear of fall by FES(fall efficacy scale) and to assess gait parameter by Cadance, Experimental group received strength and balance training and control group treated with normal ROM exercises of lower limb for fall prevention in elderly for duration of 24 weeks 4 days a week with each exercise session duration of 45 min. pre and post interventions data obtain and statically analyzed by Student t test (two tailed, independent).

Conclusion There is a positive and large effect of strength training exercises in the management of fall related gait kinematics in elderly, and that there is a marked difference in improvement in cadence and fear of falling(FES score) has been reduced in these patients when treated with strength training exercises.

Keywords- fall prevention ROM,FES, Cadance.

INTRODUCTION

Fear of falling and avoidance of activity are common in old age and are suggested to be health problems of equal importance to falls. Falling represents a significant threat to independence and quality of life (in terms of function, morbidity/mortality for example). Falling is amongst the common causes of injury affecting older people in both residential care and home settings. ‘Fear of falling’, or post-fall syndrome as it was initially described (Murphy and Isaacs 1982), is more of a symptom rather than a diagnosis and is characterised by high levels of anxiety related to walking or a fear of falling1 Fear of falling and avoidance of activity due to fear of falling are common in older people. Prevalence rates for fear of falling in community-living older persons range from 20 to above 60% 2 and for avoidance of activity due to fear of falling from 15 to above 55%. Fear of falling, and related avoidance of activity may lead to adverse consequences, like functional decline restriction of social participation, decreased quality of life increased risk of falling and institutionalization and will have societal implications related to health and social care utilization and associated costs. Indeed, fear of falling is suggested to be a potential (public) health problem of equal importance to a fall 3.

Poor walking performance has previously been associated with older age, increased risk of falling, and greater concern about falling. Changes in spatial and temporal gait parameters in older people due to concern about falling have been demonstrated via reduced speed, shorter stride length, prolonged double-support time increased cadence and increased gait variability 4.
Several recent cross-sectional studies have shown the associations of muscle strength with physical fitness and disability. Loss of muscle mass (sarcopenia) is prevalent in older adults and represents an impaired state of health with mobility disorders, increased risk of falls and fractures, impaired ability to perform ADL, disabilities and loss of independence. Muscle strength gradually decreases from the 30th year until about the 50th year of life. In the 6th decade of life, an accelerated, non-linear decrease by 15% has been observed, and by the 8th decade, this may be up to 30%. This additionally results in a substantial impairment in the sensorimotor information exchange, with a reduction in the quality of intermuscular and intramuscular coordination. Functional losses in strength and balance capacity, and increasing gait uncertainties are the result. The risk of acute problems owing to falls and injuries and chronic recurrent and degenerative illnesses rises. Hence study intended to find the effect of lower limb strengthening of elderly and to improve their fall related gait kinematics.

EPIDEMIOLOGY

In 2008, 82% of fall deaths were among people 65 and older.

Men are more likely to die from a fall. After taking age into account, the fall death rate in 2007 was 46% higher for men than for women.

The number of persons above the age of 60 years is fast growing, especially in India. India as the second most populous country in the world has 76.6 million people at or over the age of 60, constituting above 7.7% of total population.

PATHOPHYSIOLOGY

Older individuals show lower rates of moment generation in all support limb joints and a lower peak ankle moment than young adults. As strength declines with age (due to muscular, tendinous and neural alterations), leg muscle strength might be the limiting factor in preventing a fall.

Falls result from many factors, including both intrinsic and extrinsic. Intrinsic factors are internal to the individual.

Increasing age, a history of falls, impaired balance, poor muscle strength, including ankle strength, slowed reaction time, and characteristics of gait changes are examples of intrinsic risk factors (Tinetti et al., 1988; Davis et al., 1999; Lord and Fitzpatrick, 2001; Schlicht et al., 2001).

Extrinsic Factor: In a fall, more active persons are likely to be exposed to high-intensity forces at impact, whereas the risk of injury in less active persons depends more on their susceptibility. Normal gait is characterized by six kinematic mechanisms. These mechanism explain how movement of lower limb joints contribute to sinusoidal displacement of center of mass when humans walk at their preferred speed.

The most common gait changes related to the tendency to fall in older adults, in comparison to younger adults, are slower gait velocity with a shorter step length, shorter relative swing phase time, and less range of motion (ROM) at the hip, knee, and ankle joints (Judge et al., 1996; Kerrigan et al., 1998). Many studies have also shown that an elderly individual have reduced step length and spend less time with one foot in contact with the ground. Stance time increases from 59% in a 20 years old individual to 63% in 70 years old individual. Primary cause for fall related gait pattern is muscle weakness and impaired balance which results in reduced walking speed.

OBJECTIVES

- To find the effectiveness of strength training exercises in improving fall related gait kinematics in elderly.
- To compare the effectiveness of strength training exercises with that of balance training exercise in improving fall related gait kinematics in elderly.

METHODOLOGY

Research design: Pre and Post experimental study

Population: Population for the study included the age groups of 65 years to 80 years. Both male and female subjects were selected

Sample size and: Sample size of 30 subjects was taken for the study.
Sample sources:
The samples were selected from Geriatrics home in and around bangalore.

Sample design:
The sample design followed was convenient sampling with the subjects allocated randomly into 2 groups using a sequential random number generator.

SELECTION CRITERIA:
Inclusion criteria :
• Age: 65-80
• Diagnosed with fall related gait kinematics according to fall efficacy scale.
• Subjects who experienced at least 2 falls within a period of 6 months before data collection

Exclusion criteria :
• Visual and attention defect
• Fracture (general)
• Any pathological orthopedic and neurological conditions
• Acute and chronic systemic diseases or illness.

Measurement tools:
FALL EFFICACY SCALE
FES is a 10-item rating scale to assess confidence in performing daily activities without falling. Each item is rated from 1 = extreme confidence to 10 = no confidence at all.

Participants who reported avoiding activities because of fear of falling had higher FES scores, representing lower self-efficacy or confidence, than those not reporting fear of falling

CADENCE
Cadence is measured using a stopwatch where the subject has to walk for a distance of 16m and the time is recorded

Procedure:

After selection of subjects, the purpose of the study was explained and an informed consent was taken and the procedure was explained with clear instructions.

The subjects were then randomly assigned into two groups based on random number generator

Strengthening exercise includes
The exercise program contains activities of balance, coordination exercises, strength training, and walking training. In particular, it includes stretching, mini-hurdle walking, zigzag foot walk, ordinary walking, and sit-and-stand up exercises. The duration of the exercise was approximately one and the half hour for thrice a week for 12 weeks. The first 2 weeks of exercise was included acclimatization period. The exercises were be divided into five sections: a 5- to 10-minute warm-up period, 15 minute strengthening exercise, 10 minute of balance training, 15 minute of gait training, and a 10-minute relaxation (cool down) period. One- to 5-minute rest periods was taken between exercise sections. Blood pressure was recorded as a safety measure only. The exercises will be undertaken as group activities, with a major emphasis on social interaction and enjoyment

GROUP 1: experimental group
15 subjects were taken
All the subjects were given Fall efficacy questionnaire and the pre – test scores was determined.
Cadence of all the subject was calculated

Exercise protocol
WARM UP PROCEDURE
Warm up exercise was included stretching of lower limb muscles i.e.
Hamstrings, Quadriceps and calf actively

Duration of all the above mentioned exercise was 10 min

STRENGTHENING EXERCISES includes
Procedure for closed chain exercise, half wall supported squatting, Theraband strengthing Exercises for lower limb(hip flexion, extension, abduction,adduction and knee flexion, extension), 10 rep.

Duration of all the above mentioned exercise was 10-15 min
RANGE OF MOTION

Active ROM exercise for all the lower limb joints to be given ROM exercises of hip, knee and ankle joints. 10 Repetitions each lower limb in standing position.

Duration of all the above mentioned exercise was 10-15 min

BALANCE TRAINING EXERCISE includes

Mini Hurdle crossing, Zig Zag Foot Walk, Cross walking (each 3-4 min)

Duration of all the above mentioned exercise was 10-15 min

GAIT TRAINING:

Tandem Walking, Circle walking, Side walking, Backward walking, walking on foot marks

Duration of all the above mentioned exercise was 15 min

COOL DOWN EXERCISE includes

Slow walking, Deep breathing exercises

Duration of all the above mentioned exercise was 5-10 min.

Group 2 (control)

All the above exercise were followed except strengthening exercises

Duration of the study:

Three months including data collection and evaluation 24 weeks

RESULTS

STATISTICS

Study design: A Experimental study consisting of two groups, each with 15 subjects in Experimental (STRENGTH TRAINING) and 15 subjects in Control (GENRAL TRAINING EXERCISE) was undertaken to study the efficacy of strength training exercise for fall related gait kinematics in elderly based on FES score and Cadence.

Statistical software: The Statistical software namely SPSS 11.0 and Systat 8.0 were used for the analysis of the data and Microsoft word and Excel have been used to generate graphs, tables etc.

Statistical Methods: Student t test (paired) was used to find the significance of FES and Cadence between pre-intervention and Post intervention for each
Convenient sampling was adopted in the study. A group of 30 patients with fall related gait kinematics was selected. There were in the age range of 65-80 years. There were 13 male and 17 female patients, where 15 subjects are divided into two groups. There were 6 males and 9 females in experimental group with mean age of 69.8 and SD of 3.89. In the control group there were 7 male and 8 females with the mean age of 69.13 and SD of 3.04. The two groups were compared using FES and Cadence Pre and post values between the groups was compared using student t-test (two tailed and independent).

The analysis of data reveals the fear of fall related gait kinematics and strength was analyzed using FES and cadence score.

The FES score recorded a mean decrease of 1.93 ± 1.16 in group I and 4.67 ± 0.98 in group II. The P value showed significance at P= 0.001, Cadence scored recorded a mean increase of 96.5 ± 6.5 in group I and 92.67 ± 3.29 in group II. The P value showed significance at P= 0.001.

Statistical analysis was made using the statistical package software, the results showed that there was a significant difference between the pre and post scores in both experimental and control groups.

### Table: Comparison of FES and Cadence in experimental group and control group

<table>
<thead>
<tr>
<th></th>
<th>EXPERIMENTAL GROUP</th>
<th>CONTROL GROUP</th>
<th>P VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>FES</td>
<td>56.20± 6.32</td>
<td>61.67± 8.16</td>
<td>P&lt;0.001**</td>
</tr>
<tr>
<td>CADENCE</td>
<td>96.53± 6.59</td>
<td>92.67± 3.29</td>
<td>P&lt;0.001**</td>
</tr>
</tbody>
</table>

**INTERPRETATION**

The above table shows that there is significant improvement in FES and CADENCE in experimental group compared to control group. Both the post intervention data of the experimental and control group were compared which shows improvement in FES score and Cadence of the subjects.

**CONCLUSION**

The study showed that the strength training exercises produces improvements in patients with fall related gait kinematics and contributes to significant variations in the outcome measures of the patients and hence the conclusion of the study is that there is a positive and large effect of strength training exercises in the management of fall related gait kinematics in elderly, and that there is a marked difference in improvement in cadence and fear of falling has been reduced in these patients when treated with strength training exercises. This study shows that strength training exercises improves fall related gait kinematics in elderly which is one of the barrier faced by the geriatric population during their functional activities.

**Ethical Clearance**- Obtain from Institutional ethical committee.

**Source of Funding**- Self

**Conflict of Interest**- Nil

**REFERENCES**

5. Minoru Yamada, Hidenori Arai, KazukiUemura. Effect of resistance training on physical performance and fear of falling in elderly with different levels of


11. Yaron Barak, Robert C Wayennar. Gait characteristics in elderly people with history of fall: a dynamic approach. J Physical therapy 2006;86


19. Mary E. Tinetti. Falls Efficacy as a Measure of Fear of Falling J gerentol . 1990;45:239


Rehabilitation Interventions and Outcomes for a Person with Rotationplasty

M S Satish¹, S Vijay², Anand Raja³, Anitha D⁴
¹Sr. Physiotherapist, ²Chief Physiotherapist, ³Associate Professor,
⁴Physiotherapist, Cancer Institute (WIA), Chennai, India

ABSTRACT

Introduction: Functional outcome reports for people with rotationplasty are an important and demanding challenge in the Onco-rehabilitation literature. This case report chronicles the rehabilitative interventions and outcomes in a single person with lower limb tumor treated with chemotherapy and rotationplasty in a tertiary cancer centre.

Case Description: The patient was 15 years old male child who had osteosarcoma of left distal femur, treated with chemotherapy and rotationplasty. His medical history and initial physical therapist examination, along with preambulation interventions, gait training, and scores from the functional capacity are described. The results of the six minute walk test (6MWT) illustrate his progress from novice ambulatory to community ambulatory over the course of 2 years.

Outcomes: The patient achieved his goal of community ambulation with his prosthetic limb. He reported very good QOL (Quality of Life), gain in functional performance and 6MWT results revealed significant improvement at the 2-year post discharge follow-up.

Keywords: Rotationplasty; amputation; functional outcome; 6 minute walk distance; quality of life.

INTRODUCTION

Rotationplasty is an old uncommon surgical procedure, which is indicated for Proximal femoral focal deformity Sarcoma of hip, femur, Proximal Tibia, Failed LSS (Limb Salvage Surgery), Failed Total hip arthroplasty/Total knee arthroplasty, Traumatic bone loss and Severe burns with intact distal limbs. Rotationplasty has become the treatment of choice in primary bone tumours during the past. Reconstructive procedure as part of a multidisciplinary treatment concept have abolished primary amputation without compromising survival and local recurrence. Beyond survival, there is a little information on physical impairment and disability, but evaluation of the functional performance, functional capacity and quality of life is an important aspect, in the increasing proportion of long term survivors.

After the completion of surgical reconstruction of limb, patients often must accept physical disability which leads to long term impairment in the personal and social sphere.

The aim of this case study was to obtain a standard evaluation and comparison of the functional long term outcome of patients with primary bone tumour who were treated by means of reconstructive auto graft using the independent scoring system MSTS (Musculoskeletal tumour society), Cancer institute Quality of life(CI QOL) questionnaire, and Six Minute walk test (6MWT).

CASE DESCRIPTION

PATIENT HISTORY

Pradeep (not his real name) was a 15 Years old male child in his normal state of health in march 2015. He was an active student in his education and other co-curricular
activities. He was apparently normal and, 3 months back he had a fall from bicycle which was attributed to the minimal swelling and pain in his left knee. Initially pain was treated conservatively with analgesics, but with no response, he also started developing swelling on the left knee joint and slowly increasing in size, associated with difficulty in walking and bending of knee and no similar swelling elsewhere in body.

He was evaluated outside and underwent biopsy and he was diagnosed with osteosarcoma of left distal femur (large volume tumour) and he came here cancer institute (WIA) Adyar for further management. He had no co-morbidity, with no family history, and with normal personal history. After the completion of local examination and preliminary blood and other investigation he was diagnosed with an impression of non-metastatic osteosarcoma of left distal femur.

He was planned for neo adjuvant chemotherapy and also assessed for LSS. He was administered chemotherapy from June 19th to August 24th, during this period he received four cycles of chemotherapy, and he was assessed for rotationplasty or above knee amputation, due to decrease in tumour circumference from initial large volume tumour size, he was planned for rotationplasty. He underwent Type A1 rotationplasty on 25th November 2015 and was under the supervision of musculoskeletal cancer rehabilitation unit.

EXAMINATION AND SYSTEMS REVIEW

At the initial physiotherapy examinations, his vital signs were stable. His pain was well controlled on a regimen that includes long-acting and short-acting narcotics as needed. His neurological and cardiovascular screenings were without pertinent findings. The integumentary examinations revealed sutures in place on the lower extremities sutures were also in place of suction drain where it was draining serous fluid without any signs of infection. Ankle joint rotated 180 degree (neo knee joint) and cut ends of tibia and femur fixed by plates and screws, and immobilised with plaster cast. The musculoskeletal examination showed no focal range of motion deficits. The strength of all major muscle groups in all his extremities was graded as 4 out of 5 in manual muscle power testing. Regarding balance he was able to sit in bed without any support from supine lying to sitting and sitting to lying with minimal assistance. His primary goal at the time of immediate post surgery was to walk.

CLINICAL IMPRESSION I

At the time of immediate post-operative period while in acute rehabilitation, he had been in the hospital for 2 weeks he had undergone a tremendous life changing event. He was unable to care for himself in any manner except to ask for assistance. He was cognitively intact. His impairments were generalised weakness and he had functional limitations, including needing assistance with bed mobility, transfer and locomotion.

His primary problem was immobility at the outset it was unclear whether he would be able to ambulate successfully with prosthetic limb. The surgical results is a leg shortened and rotated 180 degrees, so reversed ankle function as a neo knee joint the ankle plantar flexion simulates knee extension and ankle dorsiflexion acts as knee flexion as similar as below knee amputation. The outcome is visually unusual, but functional performance outscores for children who place high-value on physical capabilities than appearance.

As a rehabilitation team met with the prosthetist, the next question was what level of ambulation would he be able to accomplish? Studies states that rotationplasty allows the patient to actively control the knee, which results in a co-ordinated gait pattern, which is similar to the gait of the able-bodied population, and better than in subjects with distal knee-amputation.

INTERVENTION

The primary goal was to maintain normal joint range of motion (ROM), to maintain joint and muscle properties, to regain muscle strength and function, to promote early ambulation and to improve the quality of life. One of the two daily sessions was dedicated to muscle strengthening, and the other focused on skills for meeting other functional goals. He also addressed his goals of self-care and prosthesis use. He performed the following exercises-Breathing exercises and incentive spirometer to strengthen the respiratory muscles and enhance alveolar ventilation, he was in slab for a period of one week hence his toe clawing movements were encouraged, crutch muscle strengthening exercises were initiated, resisted single-leg hip extension (supine) hip abduction, adduction (contra-lateral side) bilateral scapular adduction and depression. After the slab was removed (neo knee joint) ankle ROM and strengthening
exercises were started. Each exercise was performed in circuit fashion for 3 sets repetitions ranged from 8 to 15 per set. When he could do 15 reps in all 3 sets, trunk muscle strengthening exercise was performed in side plank positions and he was mobilised with crutches support. Cardio vascular exercises were performed daily for 10 minutes. Strengthening and conditioning in the pre prosthetic phase lasted for 8 weeks. During this time, pre prosthetic limb training was completed and decision was made regarding prosthetic fitting.

**CLINICAL IMPRESSION 2**

In a collaborative process, the musculoskeletal cancer rehabilitation unit finally decided to fit him in to a Prosthesis which consists of a plaster cast with a stirrup. Prosthesis is manufactured with a socket for the tuberosity, a thigh shaft with a single axle hinged joint at the upper ankle joint, with metal guides fixed at the shaft as well as the lower part of the prosthesis. The axis must have stops for the extended position as well as for the maximum possible flexion of the leg s initially (< than 70 degree this may increased to 90 degree gradually) it should not exceed 90 degree, however, because in case of fall, the ankle joint might be sprained or even broken.

Post prosthesis fixation rehabilitation goal was to progress from standing to walking in parallel bars, and to walking with walker or crutches followed by walking without crutches. Stretching and strengthening exercises are continued in and out of prosthesis. The muscles of the calf, ankle, and toe all play a role in controlling the prosthetic knee which is the child foot while in the prosthesis.

**Outcome**

At the time of discharge after 10 weeks in hospital for treatment completion and rehabilitation, his functional mobility was as follows, he was able to do bed mobility, sitting and mobilisation with crutches. After a period of 12 weeks prosthetic limb fixed and gait training given.

<table>
<thead>
<tr>
<th>Table 1. Pradeep’s QOL scores and Functional Performance in percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1st(crutch)</strong></td>
</tr>
<tr>
<td>CI -QOL Total</td>
</tr>
<tr>
<td>CI –QOL (Sub Domains)</td>
</tr>
<tr>
<td>General Well Being</td>
</tr>
<tr>
<td>Physical Well Being</td>
</tr>
<tr>
<td>Psychological Well Being</td>
</tr>
<tr>
<td>Interpersonal Relationship</td>
</tr>
<tr>
<td>Sexual wellbeing</td>
</tr>
<tr>
<td>Cognitive Well Being</td>
</tr>
<tr>
<td>Optimism and belief</td>
</tr>
<tr>
<td>Economic Well Being</td>
</tr>
<tr>
<td>Informational support</td>
</tr>
<tr>
<td>Patient physician relationship</td>
</tr>
<tr>
<td>Body image</td>
</tr>
<tr>
<td>QOL Categorya</td>
</tr>
<tr>
<td>MSTS</td>
</tr>
<tr>
<td>Pain</td>
</tr>
<tr>
<td>Function</td>
</tr>
<tr>
<td>Emotional Acceptance</td>
</tr>
</tbody>
</table>
The Quality of life score, functional performance score and 6MWT was performed 4 times: At 10 weeks after surgery (Before prosthetic limb fixation), 16 weeks after prosthetic limb fixation, 1 year post discharge and 2 year post discharge. His functional performance was assessed using MSTS, his Quality of life was assessed using Cancer institute QOL Questioner and his functional capacity was assessed by 6MWT. At discharge he reported very low QOL and his functional performance was 30% and his 6MWT with crutches was 350m, after prosthetic fixation and gait raining at 16th week his QOL was improved from very low to average QOL similarly in the sub domains of CI QOL he fared better except Body image issue, and there was a marginal increase in his functional performance around 50% and his six minute walk distance (6MWD) was 357m, at 1 year follow-up after surgery he reported high QOL and he had little issues with body image and substantial improvement (76.7%) in functional performance and his 6MWD was 489m and he continued to receive assistance with morning and evening personal care, but was otherwise independent throughout the day. The primary barrier to his full independence was an inability to don and doff his prostheses without assistance. In the subsequent 2nd year follow-up he reported high QOL where as there was a decrement scores in Psychological wellbeing and functional performance was same as in 1 year of follow-up and his 6MWD was 543m. The 6MWT was completed without an assistive device on all 3 latter assessments.

**DISCUSSION**

This process of decision making for mega surgical procedure like rotationplasty involved many varying and complex factors. Here, the multidisciplinary board, patient and family considered not only survival outcomes but also the physical and psychological impacts of this procedure including the quality of life it was our intuitive that rotationplasty would preserve better quality of life and functional status. The good functional outcome reported by him is likely due to improved surgical technique and rehabilitation approach using standardised guidelines for the rehabilitation of the patient\(^i\). In our experience we observe that the lack of exercise compliance in patient’s was related to chemotherapy induced fatigue or deconditioning, but in his case he was highly motivated to succeed and had a strong family supportive system which helped him to tide during post chemotherapy phase of exercise therapy and rehabilitation.

The ability to functionally and independently ambulate was pradeep’s initial hope and goal. Component of his progress towards meeting that goal was participating in a individual treatment plan that
took into the account, not only mobility impairment but also his musculoskeletal and psychological needs. At the time of the follow-up 1 year after discharge, his functional performance, QOL and 6MWD were better and this is in line with study suggesting that in amputee rehabilitation a difference of at least 45 metres should be observed for 6MWT to be sure that it is a real change in patients condition. At 2 year after surgery Pradeep’s 6MWD was, in par with his age and sex predicted values. In contrast to gain in functional performance and walking ability his psychological well being reduced. Now it is evident that physical health influences directly psychological wellbeing and challenges during the early post treatment period which may include, a shift in the focus of medical field, (from’ fighting cancer ’ to surveillance and recovery of wellness), fear of recurrence, resumption of alteration of life roles and diminished support from peer group. Studies have generally found trajectories indicating persistently poor mental health and reduced physical well being overtime. Enhancing the psychological wellbeing through appropriate interventions may further improve his QOL and functional outcome.

Now he is able to lead an independent life style, as his walking ability has improved, now he commutes on his own to school and take part in physical activities as advised by his medical team, he is now happy man, riding to meet his friends. This is in consistent with a study that indicates, Rotationplasty patient have a high QOL and are satisfied with good functional outcome regarding the activities of daily living. This case report describes the treatment plan charted out by a multidisciplinary team that went beyond standard striking changes in this patient’s functional capacity and health related QOL.

**CONCLUSION**

This case report shows that rotationplasty patient achieved his goal of community ambulation with his prosthetic limb. He reported very good QOL, gain in functional performance and 6MWT results revealed significant improvement at the 2-year post discharge follow-up. Though body image and psychological well being is a long term concern, it outweighs in the favour of walking ability and functional capacity.

**Ethical Clearance:** Taken from Cancer Institute Scientific Advisory Committee (SAC) and ethical board.

**Source of Funding:** Self

**Conflict of Interest:** Nil

**REFERENCES**


Study to Find out the Efficacy of Osteopathic Manual Therapy in Chest Expansion in COPD Patients

Harish S Krishna1, D’sa Peter Ivor2, Riyas Basheer K B3, Sharma Vishnu4
1Principal, Professor-Dept of Physiotherapy, Sree Anjaneya College of Paramedical Sciences, Malabar Medical College Hospital, Calicut, Kerala, 2Professor & HOD, Dept of General Medicine, KS Hegde Medical Academy, Mangaluru, Karnataka, 3Assistant Professor, Dept of Physiotherapy, Sree Anjaneya College of Paramedical Sciences, Malabar Medical College Hospital, Calicut, Kerala, 4Professor & HOD, Dept of Pulmonary Medicine, AJ Hospital & Research Centre, Mangaluru

ABSTRACT

Background: COPD causes multiple musculoskeletal changes. Even though the root cause of the changes is traced to filled alveoli and interstitial lung space consolidation, the associated musculoskeletal changes is recently blamed for much of patient’s symptoms like dyspnoea and reduced chest movements. Osteopathic manual therapy consists of a set of techniques which aims to correct the musculoskeletal abnormalities. The effect of OMT in chest expansion in COPD is studied much but explored less. Many studies on this area lacked in less sample size and unclear set of techniques used under OMT. The primary aim of the study is to find out the effectiveness of osteopathic manual therapy in chest expansion of patients suffering with COPD.

Methodology: 105 males of age group 45 to 70 years who had at least a year history of COPD were divided in to two groups. One group was given osteopathic manual therapy (OMT) technique (65nos) and the other group received conventional exercises (40nos). Chest expansion was measured using a cloth tape at axillary, nipple and xiphisternal levels. The measurement is repeated after 30 minutes and 24 hour of sessions.

Results: The values obtained were statistically analyzed using the Wilcoxon signed rank test. The chest expansion was better in both groups compared to pre readings. OMT group showed better improvements than conventional one at axillary and 4th intercostal levels. The conventional group had better results at xiphisternal level measurement.

Conclusion: Osteopathic manual therapy technique is found to be effective in improving chest expansion for patients suffering from COPD.

Keywords: COPD, Conventional exercises, Osteopathic manual therapy, chest expansion.

INTRODUCTION

Chronic obstructive pulmonary disease is a global health concern and is major cause of chronic morbidity and mortality worldwide.1,2,3 COPD is the limitation of airflow that is not fully reversible. The airflow limitation is usually progressive and associated with an abnormal inflammatory response of the lungs to noxious particles, gases. Chronic airflow limitation characteristic of COPD is caused by a mixture of small airway disease (obstructive bronchiolitis) and parenchymal destruction (emphysema), the relative contribution vary from person to person”– the global initiative for chronic obstructive lung diseases (GOLD).1

Exposure to tobacco smoke is most significant risk factor of chronic obstructive pulmonary disease. The second most risk factor is alpha antitrypsin deficiency
and certain occupational exposures. The quality of life of COPD patients is low due to their restriction in social activities mainly due to dyspnoea. Pulmonary rehabilitation, in which physical therapy is the key ingredient, primarily aims to keep the patient active and provides a positive healthy way of life.

In chronic cases the MSK changes at chest wall and vertebral column leads to abnormal tissue tensions, joint positioning, myofascial and muscle tightness. The rib cage makes a significant contribution to chest wall movements, which leads to elevated accessory muscle activities and abnormal breathing pattern, airway narrowing, loss of lung elasticity results in airway collapse and lung hyperinflation. This ultimately leads to chest wall rigidity and causes respiratory muscles acting from non-optimal lengths.

Osteopathic manual therapy is an age old technique in physical therapy which aims at mobilizing joints, stretching myofascia, increases stretch ability of muscles by various mobilization maneuvers. American academy of osteopathy explains OMT as a set of techniques which focus on the principle, that body structure and function is dependent on one another.

The prognosis of COPD depends on the mechanical impairment of chest wall. In COPD the chest wall rigidity (CWR) is high which makes the movements slow and hard. This reduces the lung capacity. Releasing or reducing the CWR benefits lung capacities. Mobilization of each spinal joint leads to increased joint movements locally and reduction in muscle tone locally. Applying this on the entire chest wall improves the mobility on the posterior components which further decreases the CWR. Once the rigidity get relieved corresponding increase in inspiratory muscle length happens and the efficacy of respiratory muscles gets better which further reduces muscle fatigue. The use of OMT is least studied in COPD cases. Studies conducted were of low quality, less sample size...etc. This study intended to study the effect of OMT in thoracic vertebrae, costo-vertebral, costo-transverse joint and thoracic myofacial mobility in COPD cases via chest expansion measurement.

**MATERIALS AND METHOD**

**Sampling method:** The study included a sample of 105 male subjects who fulfilled the inclusion and exclusion criteria. The patients who met the inclusion criteria were assigned to two treatment groups of 65 in OMT group and 40 in conventional group samples each by purposive sampling. The first group received osteopathic manual therapy and second group received conventional chest expansion exercises, incentive spirometry, and upper extremity mobilization exercises.

**Inclusion criteria:** Males of age 25-55 years, Minimum of one year History of chronic lung disease.

**Exclusion criteria:** Acute illness, Any kind of infections in the body, Fracture- rib/ thoracic vertebrae, Any other permanent orthopedic chest wall/ thoracic vertebral deformities.

**Methods:** Subjects were selected from the population group satisfying the inclusion by using purposive sampling. Informed consent was obtained from the subjects before recruited into the study. Total number of patients- 105 (groups-A- 65, group- B- 40).

**Group-A:** Patients received osteopathic manual therapy (OMT) and conventional therapy in the form of abdominal exercises, incentive spirometry, upper and lower extremity exercises and aerobic exercises.

**Group-B:** This group received conventional abdominal exercises, incentive spirometry, upper and lower extremity exercises and aerobic exercises regularly at home.

In addition to this the regular components of pulmonary rehabilitation like smoking cessation, clearing of secretions, relaxation positions, oxygen therapy, energy conversation techniques, fatigue obviation mechanisms, pranayama, nutritionary guide lines was administered to all the patients. The important exercises given and its procedure is given below.

**Exercise methodology**

- Diaphragmatic breathing
- Pursed lip breathing
- Incentive spirometry
- Upper and lower extremity exercises and Aerobic exercises

**Procedure for osteopathic manual therapy (OMT)**

**Thoracic P-A glides:** Patient was asked to sit erect
without back support at the edge of the bed. The therapist's arm supported the patient's head and neck from anterior for upper 3 thoracic spines and therapist’s trunk supported the patient's body from behind. For mid and lower spine movements the anterior support was given over the sternum by keeping a roll of cloth between the support hand and the sternum. Using thumb and V grasp the therapist performed graded P-A glides (small and large amplitude rhythmic oscillations at the beginning and at the end of the range) through the spinous process of the first till 12\textsuperscript{th} thoracic vertebrae.

**Figure 1. Thoracic P-A Glide**

Rib gliding for 3-12

**Ribs-3-12(for right-side):-** Patient is made to sit at the edge of bed, therapist stood behind the patient. The therapist grabs the patient’s right upper extremity, therapist's right hand thumb and index finger glides over the lower ribs in cranial direction with inspiration. The movement was held for 7-10 seconds and repeated several times.\textsuperscript{13}

**Figure 2. Gliding for Ribs 3-12 (for right side)**

**Intercostal muscle stretch:** Patient is in semi recumbent position with hands over abdomen. A stretch was applied on the IC space by keeping the index finger over IC space in a caudal-cephalic direction.

**Thoracic lymphatic drainage with activation:** Therapist's hand is placed over thoracic wall with thenar eminence over pectoralis muscle just below clavicles. The fingers were spread and angled towards patient's body. Patient is asked to take deep breath, during exhalation rhythmic pumping action is induced to chest wall. At the end of exhalation by keeping some residue pressure over chest wall patient is asked to inhale again, this process is repeated several times, slowly building pressure on chest wall by the therapist. On fifth inhalation hand were briskly removed. This causes sudden increase in negative thoracic pressure and air sucks in opening the rib cage.

**Measurements**

**Chest expansion:** Subjects were asked to sit erect with arm by side. A ball point pen marked the anatomical land mark such as axilla, fourth intercostal space and xiphisternum. Examiner held the cloth tape to make sure, the contour of the skin remained unchanged. Measurement of chest expansion was taken on two occasions. The examiner took measurements successfully while subjects held their breath during inhalation and exhalation. The difference between two readings was noted. The measurements were taken at 3 different levels- 1) Axillary region for upper thoracic expansion, 2) Fourth intercostal space for mid thoracic expansion, and 3) Xiphoïd process for lower thoracic expansion. An average of three trial readings is measured.

The measurements were taken thrice; Pre session, 30 minutes post session, 24 hours post session.

**RESULTS**

The mean values of chest expansion at axillary level show a graded expansion from pre to 30 minutes for both groups. The values are seen falling down 24 hours post when compared to 30 min post. The mean value of chest expansion at nipple level shows a graded expansion from pre to 30 minutes for both groups. The values are seen falling down 24 hours post when compared to 30 min post. The mean values of chest expansion at xiphisternal level show a graded expansion from pre to 30 minutes for both groups. The values are seen falling down 24 hours post when compared to 30 min post. (Table 1)
Table 1. Chest Expansion at Axillary, Nipple & Xiphisternum Levels of Both Groups (in cm)

<table>
<thead>
<tr>
<th>Levels</th>
<th>Time Bound</th>
<th>GROUP-A</th>
<th>GROUP-B</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>MEAN ± SD</td>
<td>MEAN ± SD</td>
</tr>
<tr>
<td>Axillary Level</td>
<td>PRE</td>
<td>1.90 ± 0.80</td>
<td>2.08 ± 0.90</td>
</tr>
<tr>
<td></td>
<td>MIN30</td>
<td>2.30 ± 0.75</td>
<td>2.29 ± 0.92</td>
</tr>
<tr>
<td></td>
<td>HR24</td>
<td>2.26 ± 0.66</td>
<td>1.96 ± 0.83</td>
</tr>
<tr>
<td>Nipple Level</td>
<td>PRE</td>
<td>1.70 ± 0.66</td>
<td>1.74 ± 0.67</td>
</tr>
<tr>
<td></td>
<td>MIN30</td>
<td>2.07 ± 1.01</td>
<td>2.25 ± 0.74</td>
</tr>
<tr>
<td></td>
<td>HR24</td>
<td>2.02 ± 0.96</td>
<td>2.11 ± 0.83</td>
</tr>
<tr>
<td>Xiphisternum Level</td>
<td>PRE</td>
<td>1.75 ± 0.78</td>
<td>1.66 ± 0.65</td>
</tr>
<tr>
<td></td>
<td>MIN30</td>
<td>2.42 ± 0.59</td>
<td>2.30 ± 0.95</td>
</tr>
<tr>
<td></td>
<td>HR24</td>
<td>1.82 ± 0.98</td>
<td>2.42 ± 1.08</td>
</tr>
</tbody>
</table>

The Table 2 shows the average chest expansion between the time frames in group-A. In pre-30min post(0.41) there is an increase in chest expansion at axillary level, which reduced after 24 hours(0.36). The average chest expansion at nipple level in pre-30min post (0.51) there is an increase in chest expansion, which reduced after 24 hours (0.37). The average chest expansion at xiphisternal level in pre-30min post(0.67) there is an increase in chest expansion, which reduced after 24 hours(0.07).

Table 2. Average Chest Expansion Difference of Group A (Pre-post comparison)

<table>
<thead>
<tr>
<th>LEVELS</th>
<th>GROUP-A</th>
<th>AVERAGE</th>
<th>T-VALUE</th>
<th>P-VALUE</th>
<th>RESULT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Axillary</td>
<td>PRE-MIN30</td>
<td>0.41</td>
<td>4.39</td>
<td>0.000</td>
<td>Sig</td>
</tr>
<tr>
<td></td>
<td>PRE-HR24</td>
<td>0.36</td>
<td>4.02</td>
<td>0.000</td>
<td>Sig</td>
</tr>
<tr>
<td>Nipple</td>
<td>PRE-MIN30</td>
<td>0.51</td>
<td>-5.95</td>
<td>0.000</td>
<td>Sig</td>
</tr>
<tr>
<td></td>
<td>PRE-HR24</td>
<td>0.37</td>
<td>-4.95</td>
<td>0.000</td>
<td>Sig</td>
</tr>
<tr>
<td>Xiphisternum</td>
<td>PRE-MIN30</td>
<td>0.67</td>
<td>-8.97</td>
<td>0.000</td>
<td>Sig</td>
</tr>
<tr>
<td></td>
<td>PRE-HR24</td>
<td>0.07</td>
<td>-0.55</td>
<td>0.586</td>
<td>Not Sig</td>
</tr>
</tbody>
</table>

The Table 3 shows the average chest expansion at axillary level between the time frames in group-B. In pre-30min post(0.21) there is an increase in chest expansion, which reduced after 24 hours (0.19) But the average expansion was better when compared to pre level. The average chest expansion at nipple level in pre-30min post(0.37) there is an increase in chest expansion, which reduced after 24 hours (0.32). The average chest expansion at xiphisternal level in pre-30min post(0.64) there is an increase in chest expansion, which reduced after 24 hours (0.75).
Table 3. Average Chest Expansion Difference of Group B (Pre-post comparison)

<table>
<thead>
<tr>
<th>LEVELS</th>
<th>GROUP-B</th>
<th>AVERAGE</th>
<th>T-VALUE</th>
<th>P-VALUE</th>
<th>RESULT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Axillary</td>
<td>PRE-MIN30</td>
<td>0.21</td>
<td>2.179</td>
<td>0.034</td>
<td>Sig</td>
</tr>
<tr>
<td></td>
<td>PRE-HR24</td>
<td>0.12</td>
<td>1.519</td>
<td>0.135</td>
<td>Not Sig</td>
</tr>
<tr>
<td>Nipple</td>
<td>PRE-MIN30</td>
<td>0.37</td>
<td>-4.095</td>
<td>0.000</td>
<td>Sig</td>
</tr>
<tr>
<td></td>
<td>PRE-HR24</td>
<td>0.32</td>
<td>-3.130</td>
<td>0.003</td>
<td>Sig</td>
</tr>
<tr>
<td>Xiphisternum</td>
<td>PRE-MIN30</td>
<td>0.64</td>
<td>-6.361</td>
<td>0.000</td>
<td>Sig</td>
</tr>
<tr>
<td></td>
<td>PRE-HR24</td>
<td>0.75</td>
<td>-6.002</td>
<td>0.000</td>
<td>Sig</td>
</tr>
</tbody>
</table>

The comparison of expansion between shows a better expansion values in group-A which is OMT group compared to the conventional one in all time frames. For both the groups the expansion reduced considerably at 24 hours, in that conventional group expansion reduced than pre values. Chest expansion at nipple level immediately after the treatment and while checked after 24 hours shows a better expansion values in group-A that is OMT group compared to the conventional one in all time frames. For both the groups the expansion reduced considerably at 24 hours. Chest expansion at xiphisternal level immediately after the treatment and while checked after 24 hours shows a better expansion value in group-A that is OMT group compared to the conventional one in all time frames. For group A the expansion reduced considerably at 24 hours, but for group-B the expansion was better which is seen only at this level. (Table 4)

Table 4. Average Chest Expansion Difference Between the Groups

<table>
<thead>
<tr>
<th>Levels</th>
<th>Differences</th>
<th>Group</th>
<th>Mean ± SD</th>
<th>T value</th>
<th>P value</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Axillary</td>
<td>PRE - MIN30</td>
<td>A</td>
<td>0.40 ± 0.75</td>
<td>-1.44</td>
<td>0.152</td>
<td>Not Sig</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B</td>
<td>0.21 ± 0.71</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRE - HR24</td>
<td>A</td>
<td>0.34 ± 0.73</td>
<td>-3.95</td>
<td>0.000</td>
<td>Sig</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B</td>
<td>0.19 ± 0.58</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nipple</td>
<td>PRE - MIN30</td>
<td>A</td>
<td>0.50 ± 0.69</td>
<td>-1.02</td>
<td>0.308</td>
<td>Not Sig</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B</td>
<td>0.37 ± 0.68</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRE - HR24</td>
<td>A</td>
<td>0.36 ± 0.59</td>
<td>-0.44</td>
<td>0.658</td>
<td>Not Sig</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B</td>
<td>0.31 ± 0.75</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ziphisternum</td>
<td>PRE - MIN30</td>
<td>A</td>
<td>0.66 ± 0.60</td>
<td>-0.26</td>
<td>0.796</td>
<td>Not Sig</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B</td>
<td>0.63 ± 0.75</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PRE - HR24</td>
<td>A</td>
<td>0.07 ± 1.01</td>
<td>3.74</td>
<td>0.000</td>
<td>Sig</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B</td>
<td>0.74 ± 0.94</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

There is a significant difference in chest expansion value at axillary level for group-A (OMT) compared to conventional group when checked pre- 24 hours. Moreover, There is a significant improvement in chest expansion at nipple level for both groups but there is no statistically significant difference between the groups. And also there is a significant difference in chest expansion value for group-A (OMT) compared to conventional group when checked pre- 24 hours.
DISCUSSION

Both groups showed a commendable expansion after 30 minutes of treatment, OMT group showed a better expansion. The reasons behind the effectiveness of OMT are: 1) In chronic COPD cases there exists intercostal muscle spasm due to strenuous breathing. The spasm impedes with the chest expansion. The conventional exercise doesn’t address this change. Grade-1 and 2 glides given to thoracic reduce the pain due to its neuro-inhibitory effect which in turn reduces spasm. 2) The movements of the costo-vertebral and costo-transverse joints are restricted primarily due to spasm, which in turn leads to stiffness. Manual therapy works through biomechanical or neuro-physiological mechanisms or combined effects. In the light of Studies conducted before supports biomechanical corrections (Coppieters & Butler, 2007, Gal et al., 1997) as well as neuro-physiological effects (DeVocht et al, 2005, Dishman & Bulbulian, 2000, Suter et al, 1999). The following are the mechanisms through which manual therapy works to improve the range of motion. 15 a) Tissue deforming effect, b) The mobilization stretches tightened capsules, muscles, ligaments, c) Unbuckling of motion segments.

Interestingly both groups have reduced chest expansion after 24 hours with OMT group affected more. Even though the expansion is reduced it has not gone below the pre levels except in conventional group at nipple level. The reason for these phenomena can be exercise induced muscle soreness. All the patients’ undergone therapy in both groups was highly satisfied subjectively and the next day almost all have complained uneasiness.

The result shows an increase in chest wall expansion at all levels in OMT group. The chest expansion improved at all levels in conventional group also except axillary level, were it has not shown any difference.

Even though in general the chest expansion improved in conventional group after the treatment which includes postural drainage and diaphragmatic exercises, the axillary level expansion is not improved. This may be due to the firm closure of rib cage by osseo-ligamentous structures and the presence of more demi-facets at that level. The decreased upper chest wall mobility is a well established fact and it has been well compensated by lower chest wall movements by the influence of diaphragm in COPD patients.

CONCLUSION

The patients undergone OMT has a better expansion at all time frames except at xiphisternal level. This study shows the efficacy of OMT in chest expansion.

Ethical Clearance: Ethical clearance was done from the Central Ethics Committee, Nitte Deemed to be University, Mangaluru.

Funding: Self funded

Conflicts of Interest: Nil

REFERENCES


Effectiveness of Occupational Therapy Interventions on Depression and Quality of Life of Mothers with Autistic Children

Sadia Khanum¹, Rashida Begum²

¹Master of Occupational Therapy Student, ²Assistant Professor, Jamia Hamdard University, Department of Rehabilitation Sciences, Faculty of Nursing and Allied Health Sciences, Mehrauli - Badarpur Road, Near Batra Hospital, Hamdard Nagar, New Delhi

Background: Evaluate the prevalence of depressive symptoms in mothers of autistic children and to identify correlations between quality of life and socio-demographic profile.

Objective: Effectiveness of occupational therapy intervention on depression and quality of life of mothers with autistic children.

Materials and Method: A pre-test post-test single group design was used. The study was conducted with 40 mothers who had their child diagnosed with autism spectrum disorder. Permission was taken from two different therapy centres located in New Delhi. 40 mothers, fulfilling the inclusion criteria were selected. They were asked to given a written consent for the participation in the study. General assessment of mothers was carried out. Depression and Quality of life of mothers with autistic children was assessed by face to face interview using Beck Depression Inventory (BDI) and World Health Organization Quality of life-BREF (WHOQOL-BREF). Occupational therapy interventions given to those mothers who have depression and low quality of life.

Results: The finding of present study shows that an occupational therapy intervention gives a positive impact on mental health situation as well as on physical health of mothers with autistic children. Mean scores of Beck Depression Inventory (BDI), pre and post intervention are 3.98 and 2.03 respectively t-value is 15.754. This shows regression in Beck Depression Inventory (BDI). Quality of life is also improved in all four domains.

Conclusion: It is concluded that occupational therapy interventions are helpful for mothers with autistic children to deal with depression and enhance their quality of life.

Keywords: Depression, Quality of life, Mothers of autistic children

INTRODUCTION

The American Psychiatric Association’s Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition, defines ASD as a category that includes “Autistic disorder (autism), Asperger’s disorder, childhood disintegrative disorder, and pervasive developmental disorder not otherwise specified”¹. The core deficits associated with an ASD are impairment in social interaction and communication, as well as the presence of unusual behaviors ¹.

The prevalence rate of autism in India is 1 in 250 and currently 10 million people are suffering in India. (The times of India, Ahmadabad, 2nd April 2013)².

Research has indicated that maternal stress in families with children with autism ³, ⁴ is predicted by their children’s co-existent behavior problems and also by their partner’s depression. A study suggested that in such critical situation when the child is disabled, mother’s personality is mostly affected because of their responsibilities and role in the family ⁶. It is very stressful for mothers when they are overload by the care
requirements of a disabled child, income problems, and other everyday jobs. Anxiety and depression affect negatively quality of life of mothers.

Most of the researches in the field of rehabilitation are done as a correlation study. Occupational therapist works on holistic approach so, these treatment strategies may be helpful for mothers in how to cope-up with situation, how to maintain her schedule, how to reduce anxiety and control irritation and to maintain sleep cycle and mothers can get more confidence and can provide purposeful environment to their children as well as for herself.

**METHODOLOGY**

**TYPE OF STUDY:** Pre and post single group design intervention based study

**SAMPLE SIZE:** 40

**PLACE FOR DATA COLLECTION:** Udaan For The Disabled, Shakti 4 Kids

**SAMPLING DESIGN:** Convenient Sampling

**VARIABLES**

**Independent variables:** Occupational Therapy Treatment Program.

**Dependent variables:** Depression, Quality of life

**INCLUSION CRITERIA**

Mothers of children diagnosed with autism according to DSM-5 criteria

Mothers age group 20-40

**EXCLUSION CRITERIA**

Mothers who have any other psychiatric problem.

Mother diagnosed with any severe medical condition.

**OUTCOME MEASURES**

**Beck Depression Inventory:** It is 21-item self-report measure of the cognitive, affective, and somatic dimensions of depression. It takes 5 minutes for administration. Items sum to a total score that can range from 0 to 63. The symptoms in the inventory are divided into mood, thought, motivational and physical sets. Its reliability and validity is 0.92 and 0.93 respectively.

**World Health Organization Quality Of Life-BREF:** It comprises 26 items, which measure the following broad domains; physical health, psychological health, social relationships and environment. It assesses the individual’s perceptions in the context of their culture and value system, and their personal goals and standards.

**General Assessment Performa**

**PROCEDURE**

43 mothers of autistic children participated to study. Participation is voluntary and data would be handled confidentially. 40 of 43 mothers accepted participating in the present study. The procedures and purpose of study were described in detail to the mothers and written informed consents were obtained. The mothers were solicited for participation through rehabilitation centers; Permission was taken from two different therapy centers in the different regions of New Delhi. General assessment of mothers was carried out. Beck Depression Inventory (BDI) was used to assess depression. World Health Quality Of Life-BREF (WHOQOL-BREF) was used to assess quality of life of the mothers. Therapist made a brief explanation about the questionnaires to mothers, in the rehabilitation centers. Questionnaires were in Hindi and English language. Occupational therapy interventions given to those mothers who have low quality of life and depression. Post assessment was done after 8-week intervention programme, conducted 24 sessions, duration of each session was 45 minutes. The score obtained was sent for data analysis.

**STATISTICAL INTERPRETATION**

Data Analysis was done by (SPSS) software Statistical Package for social science (version 22). Paired t-test was used for pre-post single group design to evaluate efficacy of occupational therapy intervention on Depression and Quality of life in mothers of autistic children. Paired t-test coefficient “t-value” was calculated and sig.2tailed (p value) was evaluated. Pre and Post scores graph was established between all domain of WHOQOL-BREF scale and BDI entries were checked for any possible error.

**RESULT**

This study, explore quality of life and depression in
mothers of autistic children and provide some effective occupational therapy interventions to these mothers. Hypothesis of the study was to evaluate quality of life and depression in mothers of autistic children who met the inclusion and exclusion criteria of the study. So, finding shows through pre-study score’s that mothers of autism children have hampered quality of life in all four domains of World Health Organization Quality Of Life-BREF instrument [24]. Hypothesis, of this study was to evaluate efficacy of occupational therapy interventions on depression and low quality of life of mothers of autism children. Study shows significant result at p-value 0.01 level for depression and quality of life domains. BDI pre-score was (mean value = 3.98) and post-score was (mean value = 2.03), t-value (15.754) shows significant improvement in depression.

GRAPH I

INTERPRETATION: Showing comparison of pre and post physical health domain of Quality of Life scale. Mean scores of physical domain of whoqol-Bref scale, pre and post intervention are 38.78 and 65.43 respectively. This shows improvement in physical domain. Results are highly significant at the ‘p’ value of 0.01.

GRAPH II

INTERPRETATION: Shows comparison of pre and post psychological domain of QOL-BREF. Mean scores of psychological domain of whoqol-Bref scale, pre and post intervention are 35.53 and 66.13 respectively t-value is 15.187. This shows improvement in psychological domain. Results are highly significant at the ‘p’ value of 0.01.

GRAPH III

INTERPRETATION: Shows comparison of pre & post social relation domain of QOL-BREF. Mean scores of social relation domain of whoqol-Bref scale, pre and post intervention are 43.93 and 67.68 respectively t-value is 6.856. This shows improvement in social relations domain. Results are highly significant at the ‘p’ value of 0.01.

GRAPH IV

INTERPRETATION: Shows comparison of pre and post environmental domain of QOL-BREF. Mean scores of environment domain of whoqol-Bref scale, pre and post intervention are 45.95 and 64.68 respectively t-value is 10.902. This shows improvement in social relations domain. Results are highly significant at the ‘p’ value of 0.01.
INTERPRETATION: Showing regression in depression level of forty subjects of study, which was associated with autism children. Mean scores of Beck Depression Inventory (BDI), pre and post intervention are 3.98 and 2.03 respectively t-value is 15.754. This shows regression in Beck Depression Inventory (BDI). Results are highly significant at the ‘p’ value of 0.01.

Pre-study score shows that mothers of autism children have hampered quality of life in all four domains of World Health Organization Quality Of Life-BREF instrument[24]. Mothers of autistic children also showed depression when measured through Beck Depression Inventory before the Occupational Therapy Intervention (mean value =3.98).

Coping strategies (me time, planning, sharing the load, knowledge is power, lifting the restraints of labels, recognizing the joys) shows significant improvement, it reinforced mothers how they got leisure time, how they can rid irritation because of hectic schedule, how they can manage their quality of time. Heather Miller Kuhaneck (2010) reported that in their study the participants perceived that they had a variety of ways to cope effectively with parental stress and it gives positive aspects of raising a child with a disability and provides a framework from which paediatric therapists can assist mothers of children newly diagnosed to cope effectively. Time management is most important for mothers to achieve a greater balance between work, rest, and leisure activities. Valerie Custer et.al (1985) reported that the therapist taught patient to keep a log of his daily activities to improve his time management skills.

Aerobic exercise helps mothers to reduce fatigue and enhance energy level [44]. To deal with daily stressor’s visual imaginary, slow repetitive breathing, Jacobson relaxation exercise are work as a powerful tool. These exercises help mothers to maintain sleep cycle. Deep breathing work as a calming tool. Valerie Custer et.al (1985), describe visual imagery, slow, repetitive, deep breathing; and progressive muscle relaxation as ways to reduce overall anxiety. The patient found that visual imagery and breathing techniques worked best for him, and he successfully incorporated them into his daily routine.

Motivational interview and role playing have effective impact on mother’s self-esteem, feeling of self-worth, bodily image and makes their thinking more positive towards their life and improves self-confidence to deal with any kind of situation. Valerie Custer et.al (1985), to improve the patient’s self-esteem and feelings of self-worth, the therapist used role-playing. In addition, the patient was required to report on one positive thing he had done for himself every day and Role-playing techniques were used to solve difficult social situations and to improve the patient’s social skills.

DISCUSSION

The results of this study indicated that Occupational therapy interventions worked effectively on daily stressors of mothers. Now they are more confident and showing positive enthusiasm towards life.
Mother educational booklet was also prepared for mothers and given to them on two different therapy centres which are approached to get population (autism children mothers). Mothers were encouraged to attain the 30 minutes “Education programme for Autism Mothers” through which they are aware about autism and gives information how mothers can understand the nature of child sensory motor preferences.

CONCLUSION

Our study showed that mothers of autistic children have low Quality of Life and Depression through pre scores. Post-intervention group showed highly significant result at p value <0.001 in all domain of WHOQOL-BREF Scale and in BDI. Occupational therapy interventions showed significant results in mothers of autistic children. It also improved quality of life in all four domains physical, psychological, social relations, environment with t-value 12.782, 15.187, 6.856, 10.902 respectively. In the light of these finding we think that occupational therapy interventions are helpful for mothers to deal with daily stressors and to enhance their quality of life.

Ethical Clearance- Nil

Source of Funding- Nil

Conflict of Interest - Nil

REFERENCES

5. Beck Depression Inventory (BDI).—Developed by Beck, Ward, Mendelson, Mock, and Erbaugh (1961) to measure depression.
8. Heather Miller Kuhaneck et.al; A Qualitative Study Of Coping In Mothers Of Children With An Autism Spectrum Disorder Occupational Therapy Faculty Publications April 14, 2010
9. Diego Mugno, Liliana Ruta et.al (2007);Impairment of quality of life in parents of children and adolescents with pervasive developmental disorder Health and Quality of Life Outcomes, IJRD.
15. Emile Cappe et.al; Quality of life: a key variable to consider in the evaluation of adjustment in parents of children with autism spectrum disorders and in the development of relevant support and assistance programmes Qual Life Res (2011)
17. Allik et;al health-related quality of life in parents of school-age children with Asperger Syndrome or High-Functioning Autism. Health Qual Life
Outcomes 2006,
24. B C Shu et.al; the mental health in mothers with autistic children: a case-control study in southern Taiwan. The Kaohsiung Journal of Medical Sciences, 01 Jun 2000
30. AOTA fact sheet on Depression, feb2014.
33. Jenny Fairthorne Experiences Impacting the Quality of Life of Mothers of Children with Autism and Intellectual Disability Psychology Research, ISSN 2159-5542 August 2014.
34. Rashida Begum, This study evaluates psychological status of mothers of children with cerebral palsy and mothers of normal children Indian journal of occupational therapist 2010.
38. Fatemeh Ahadi Effect of 8-week Aerobic Exercise and Yoga Training on Depression, Anxiety, and Quality of Life Among Multiple Sclerosis Patients Iranian Rehabilitation Journal, Vol. 11, No. 17, April 2013.
Comparison between Handgrip Strength Measurement of Dominant Hand and Non-Dominant Hand in Basketball Players

Priya S¹, Mayur Rai², Dinu K Joseph³
¹Assistant Professor, Laxmi Memorial College of Physiotherapy, Mangalore, ²Assistant Professor, Department of Orthopedics, A.J Institute of Medical Sciences, Mangalore, Karnataka, ³Post graduate Student, Laxmi Memorial College of Physiotherapy, Mangalore

ABSTRACT

Background: The hand morphology and functional properties play an important role in performance in various sports activities which includes basketball. Handgrip strength is important in basketball as various movements rely on continuous use of wrist and digits flexors in catching, holding and shooting the ball where significant degree of grip strength is needful for the success. The comparison between handgrip strength measurements in dominant hand and non-dominant hand in basketball players remains largely unreported.

Objectives: To compare handgrip strength measurement of dominant hand and non-dominant hand in basketball players.

Method: A cross sectional study in which 50 basketball players of age (15-25 years) of both genders were assessed in the study. The players were selected using universal sampling technique. Handgrip strength was measured in both dominant and non-dominant hand with subjects in sitting position, elbow flexed 90°, forearm in midprone position, wrist extended between 0-30° and ulnarly deviated. The subject held dynamometer and explained that the adjustable handle of the dynamometer does not move while gripping it. Handgrip strength was measured in kilogram force units as indicated on the outer aspect of the dial by the red peak needle.

Statistical Analysis: Data collected were subjected to statistical analysis using spss version 17, which was used to create graphs and tables. The comparison between the handgrip strength of dominant and non-dominant hand was done using z-test.

Results: In this present study mean values of hand grip strength of dominant hand is 34.644kg and in non-dominant hand is 32.694kg there is no significant increase in the handgrip strength in dominant and non-dominant hand was found (t = 1.365, p = .176).

Conclusion: The study concludes that there is increase in handgrip strength measurement of dominant hand than non-dominant hand of basketball players.

Keywords: Hand grip strength, dominant hand, non-dominant hand, basketball players.

INTRODUCTION

Basketball is a game played in all over the world. Basketball requires tremendous physical stamina, individual proficiency, neuromuscular coordination, lung capacity, quick reflexes, intelligence and presence...
Basketball require comprehensive ability including physical, technical, mental and tactical abilities. Among them physical abilities of players exert marked effects on the skills of the players themselves and the tactics of the team. For basketball games in which the use of the hand is essential, hand morphology and functional properties could be important for the performance. Its effectiveness in these activities is due to particular configuration of the bones and muscles which permits opposition of the pulp surface of the thumb to the corresponding surfaces of the other four finger tips in a firm grasp, together with a highly elaborated nervous control and sensitivity of the fingers. The human hand is unique in being free of habitual locomotors duty and devoted entirely to functions of manipulation.

Basketball is recognized as being a complex technical game. Performance differences between players of varying ability levels have also been identified in the body anthropometric characteristics. Hand dimensions and a sufficient degree of grip strength are also necessary to be successful, starting when players are young. Such a positive correlation among hand strength and body anthropometric parameters (height, weight and body mass index-BMI) has been evaluated in children and adolescents in many studies.

Shooting is a complex action, it includes the way of handling the ball, the method of hand movements, the coordination of upper and lower limbs, and aiming point. Each part has an effect on final shooting percentage, so people need to practice every part hardly so as to maintain a high score percentage. To make a successful shot, one should make his five fingers separate, pull wrist back and hold the bottom of the ball with the above parts of his hand, keep palm empty, fingers bent slightly, and the breading and spherical radian should be the same, keep the gravity line of the ball almost in the vertical plain between index and middle fingers, elbow adduction, face the basket, carry the ball upon his shoulder. Before shooting, another hand should hold the other side of the ball. Strength in basketball does depend on the athlete’s position to an extent, although all basketball players need a significant amount of muscle strength. The longer the finger lengths, the better the accuracy of the shot or throw in the handball and basketball game. All shots and throws are finished with the wrist and fingers. It was proposed that athletes with longer fingers and greater hand surface parameters also probably have greater grip strength.

Anthropometric dimensions of basketball players have been linked with playing position and individual player’s success. One aspect of scientific approach which is receiving greater attention is that of the structural measures, lengths, breadths and girths of body and body composition to achieve optimum playing ability.

Dimensional characteristics of the hand in many sports branches, especially in basketball that include grasping something and moves of throw, anthropometric dimensions of the hand and correspondingly the handgrip strength affect success.

Upper extremity muscle and grip strength are the primary physical factors affecting passing accuracy. Moreover, all shots and passes work more efficiently when the hand surface parameters are larger and when the fingers are longer and stronger. In fact, in basketball, as in the other popular sports such as volleyball, softball and handball, where the relation between hand and ball is fundamental.

The handgrip strength measurement is a simple and economic test that gives practical information about muscle, nerve, bone, or joint disorders.

Handgrip strength is important for catching and throwing the ball in different team sports. Also, when the fingers are longer and hand surface variables greater than required for grasping a ball, fingers will widely spread, and grasping an object will become more efficient and less fatiguing. The goals of diagnostic procedures in different anthropological aspects are useful for: the identification of children and directing them to basketball as sport, the direction and specialization for specific roles in a team, the selection of basketball players at higher selection stages at certain age- or quality-specified categories, and the creation of a composition of basketball teams.

**MATERIALS AND METHOD**

50 players were selected from the Mangala stadium Mangalore and university college Mangalore and explained about the study. After initial assessment the participants who met the inclusion criteria (Age 15-25 years, both males and females, subjects who playing basketball more than one year, subjects who practice minimum 1hr daily) and exclusion criteria (Subjects with upper limb and hand injuries, subjects with any history of metabolic disease, subjects with any history
of upper limb injuries in last 6 months) were excluded and the informed consent was taken from the players being studied. Ethical clearance was approved by ethical board before starting the study. Anthropometric characteristics (height, weight and body mass index) were determined. Then complete clinical examination of each subject was done. Players who were included were further assessed for handgrip strength measurement of both dominant and non-dominant hands.

**FINPINDS**

Descriptive statistics showed that hand grip strength of dominant hand is 34.644kg and in non-dominant hand is 32.694kg there is non-significant increase in the handgrip strength in dominant hand was found (1.95kg).

**Table 1: Shows mean, std. deviation of handgrip strength of 50 basketball players**

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>HGD</td>
<td>50</td>
<td>34.6980</td>
<td>7.50176</td>
<td>1.07168</td>
</tr>
<tr>
<td>HGND</td>
<td>50</td>
<td>32.6673</td>
<td>7.22727</td>
<td>1.03247</td>
</tr>
</tbody>
</table>

**Table 2: Shows significance and z value of handgrip strength of dominant hand and non-dominant hand.**

<table>
<thead>
<tr>
<th></th>
<th>z</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Handgrip strength of dominant and non-dominant hand</td>
<td>1.365</td>
<td>.176</td>
</tr>
</tbody>
</table>

**DISCUSSION**

Basketball is an aerobic anaerobic based sport which requires muscular strength conditioning both in lower and upper limbs. In basketball number of movements rely on the continues use of wrist and digit flexors in catching, holding, shooting and passing so hand strength is fundamental in this game. Upper extremity muscle and grip strength are the primary physical factors affecting passing accuracy. Moreover all shots and passes work more efficiently when the hand surface parameters are larger and when the fingers are longer and stronger which probably yields better handgrip strength.

In this present study 32% of the players were in the age of 16 years which was highest in this study, whereas the least was in 21 years with frequency of 1 and percentage was 2. Seven players belong to age 15 years and 17 years their percentage in this study was 14. Four players belongs to age 18 years with 8%. Two players having age of 24 years with 4 percentage of the total players. In 2012 Vassilis Gerodimos et al in their study states that hand grip strength significantly increased across the age groups, the gradually increasing values in handgrip strength from childhood to adulthood observed.

In this present study 12 females with percentage of 24 and 38 males with percentage of 76 were studied. Shyamal Koley and Santhosh B Kumar in 2011 in their study state that males attaining stronger grip than their female counterparts. In a similar study Dieter Leyk et al find that a significant effect of gender in the handgrip strength. Joy C MacDermid in his similar study state that gender is a strong predictor of strength, partially because of this influence grip strength can be more accurately predicted from physical factors.

In this study mean values of hand grip strength of dominant hand is 34.644kg and in non-dominant hand is 32.694kg there is a significant increase in the handgrip strength in dominant hand was found (1.95kg). In 2015 Akif et al in their study states that dominant hand grip strength is greater than non-dominant hand. If we compare our study with the similar international study conducted Cagatag et al in 2008 on school basketball players with 9-18 years of age we found that higher values in handgrip strength in dominant hand rather than non-dominant hand.
These result confirm that athletes with large hand span measurement might have biomechanical advantages, considering this information coaches and athletic trainers should be conscious of the importance of the handgrip strength conditioning, while talent scout should be aware of importance of hand span measurement role in female basketball players talent recruitment. in fact hand grip strength showed in this study could provide a reference scale in order to organize an effective strength conditioning, to avoid sports specific injuries, and finally to improve players performance in different basketball categories.

**CONCLUSION**

Findings of this study showed that there is no significant increase in handgrip strength measurement of dominant hand and non-dominant hand in basketball players but dominant hand shows greater improvement than non-dominant hand.

**Conflict of Interest**: The authors agree that there was no conflict of interest

**Source of Funding**: no external source of funding was utilized for the study.

**Ethical Clearance**: ethical clearance was obtained from institutional committee of A.J Institute of Medical Sciences and Research Centre.

**REFERENCES**


2. Nandani Milin, A study to find out the correlation between handgrip strength and hand span amongst healthy adult male, Indian Journal of Physical Therapy, Volume 2 Issue 1.


4. Archana Chahal, Bharat Kumar Relationship of hand anthropometry and hand grip strength in junior basketball boys, International Journal of Health Sciences and Research ISSN: 2249-9571


15. Joy C MacDermid et al The Effect of Physical Factors on Grip Strength and Dexterity, British Journal of Hand Therapy 2002 Vol 7 No 4


20. Defne Öcal Kaplana Evaluating the relation between dominant and non-dominant hand perimeters and handgrip strength of basketball, volleyball, badminton and handball athletes, international journal of environmental & science education 2016, VOL. 11, NO.10, 3297-3309


23. Richard Kucsa, Peter Mačura Physical characteristics of female basketball Players according to playing position, Acta Facultatis Educationis Physicae Universitatis Comenianae Vol. 55 No 1 2015

24. Dr. Kuldeep Singh et al Kinanthropometric profile as a predictor of basketball players strength measures, August, 2013 Vol 2 Issue 8, ISSN: 2278 – 0211


27. Li Zhen et al A biomechanical analysis of basketball shooting, DOI 10.5013/IJSSST.a.16.3B.01
Occurrence of Flat Foot in Grade-I Obese Teachers – A Cross Sectional Study

Niyati N Mistry1, Suchit S Shetty2
1Intern, 2Assistant Professor, Department of Neuro Physiotherapy, Dpo’s NETT College of Physiotherapy, Thane, Maharashtra, India

ABSTRACT

Study Design: A cross sectional study.

Objective: Prevalence of flatfoot in grades I obese teachers working more than 5 hours.

Background: Flat foot is described as a loss of Medial Longitudinal Arch (MLA) of the foot, valgus deformity of the heel and medial taral prominence, the deformity is usually asymptomatic and resolves spontaneously in the first decade of life. There are majority of studies on prevalence of flat foot conducted on obsessed children’s but there is dearth in literature on obsessed adult, in spite of that we can say that there is no literature available on flat foot in a school teachers. The work profile of teachers is in standing position. While standing; pressure from gravity multiplies the body weight on each foot, by 3 or 4 times. With the passing of time, muscle imbalance may result in an abnormality in the foot’s natural arch. The arch of a metatarsal may become flat due to access weight or stress from pounding on surface. Hence this study was undertaken to find out occurrence of flat foot in GRADE - I obsessed teachers.

Method: The present study was carried out in high school teachers in Mumbai 2018. They were selected according to body mass index to be grade I obese teachers. Evaluation for each teacher was done using the Foot Posture Index-6. The Foot Posture Index-6 was used to assess foot posture. Prevalence of flatfoot was evaluated statistically

Results: Present study shows that among selected grade-I obese teachers working more than 5 years, 53% are classified into pronated flat foot, while 17% are classified into supinated flat foot and 30% are classified into normal foot.

Conclusion: This study concludes that 53% grade-I obese teacher have pronated flat foot while 17% have supinated flat foot and 33% have normal foot. So the present study indicates that there are more Grade-I obese teachers comes under pronated flat foot as compare to supinated flat foot and normal foot.

Keywords: Teachers, Flatfoot, Prevalence.

INTRODUCTION

Flat foot is also known as pesplanus. Pesplanus (‘flat foot’) is one of the most common conditions observed in adult health practice. The true prevalence of flat foot is unknown, primarily because there is no consensus on the strict clinical or radiographic criteria for defining the flat foot.1

Flat foot is described as a loss of Medial Longitudinal Arch (MLA) of the foot, valgus deformity of the heel and medial taral prominence, the deformity is usually asymptomatic and resolves spontaneously in the first decade of life. The foot has three arches; the medial longitudinal arch, the lateral longitudinal arch
and the transverse arch. The medial longitudinal arch is the highest and most important of the three arches. It is composed of the calcaneus, talus, navicular, cuneiforms and the first three metatarsals. The lateral longitudinal arch is lower and flatter than the medial longitudinal arch. It is composed of the calcaneus, cuboid, and the fourth and fifth metatarsals. The transverse arch is composed of the cuneiforms, the cuboid and the five metatarsal bases. The arches of the foot are maintained not only by the shapes of the bones as well as by ligaments. In addition, muscles and tendons play an important role in supporting the arches. The definition of flat foot is not standardized, never the less but the height of the medial longitudinal arch is the principal parameter to be observed and measure. Human foot has been an object of interest of various specialists. Leonardo da Vinci, a Renaissance genius, painter, and architect, remarked that it was a most brilliantly structured machine and a true piece of art. The foot consists of 26 bones and more than 30 articulations enabling three fundamental functions: supporting, shock absorbing, and weight bearing. 

Many factors influence the structure and functioning of the foot, one of them being body weight. Additional stress load applies to the foot. As excessive amounts of weight are forced upon the feet, the muscles, tendons and ligaments that hold up the arch, do not become stronger. They become more stretched and weaker due to the extra weight that is forced upon these structures. In time, if these structures are not protected, they will allow the bones and joints of the feet to shift and collapse, causing the arch to become painful and even flat. This will lead to pain not only in the feet and ankles but also to pain in the shins, lower back knees and hips.

Some parameters are considered as the predisposing factors of flatfoot, such as age, sex, body composition, ligament laxity, family history, types of footwear and age at which shoe wearing began.

The problem of overweight and obesity and their influence on foot arches has been frequently dealt with, particularly in the context of an influence of excessive weight on flat foot incidence. Over the past decades, the number of overweight and obese children has risen worldwide. Overweight is reported to be one of the most serious health problems of the twenty-first century.

Feet, as the body’s base of support, continually endure often high ground reaction forces generated during activities of daily living. The component primarily responsible for the feet is absorbing and dissipating these forces in the longitudinal arches. Although this arch comprises bony articulations ligaments and muscles, it is primarily the ligaments that support and stabilize the longitudinal arch, as well as acting as powerful energy-storing mechanisms. Muscle provides secondary support by maintaining the arch during dynamic tasks. Ligaments rarely incur physiological fatigue and therefore offer a greater resistance to stress compared to muscles. Flatfoot is often a complex disorder, with diverse symptoms and varying degrees of deformity and disability. There are several types of flatfoot, all of which have one characteristic in common—partial or total collapse (loss) of the arch. Flatfoot is one of the most common types of flatfoot. It typically begins in childhood or adolescence and continues into adulthood. It usually occurs in both feet and generally progresses in severity throughout the adult years. As the deformity worsens, the soft tissues (tendons and ligaments) of the arch may stretch or tear and can become inflamed.

A number of observational assessment scales have been developed to address the issue of the poor reliability of foot measures. Most recently the Foot Posture Index-6 (FPI-6) has been developed for which normative values has now been collected. The FPI-6 is a novel method of rating foot posture using set criteria and a simple scale. It is a measure of standing foot posture and so is not a replacement for gait assessment where time and facilities exist. It is however, a more valid approach than many of the static weight bearing and non-weight bearing goniometric measures currently used in clinic. The FPI-6 is an assessment tool that is thought to reduce many of the reliability concerns surrounding more traditional measures of the foot. The FPI-6 has been refined from an eight point scale to a six point scale and permits assessment across the three planes of the foot. The foot posture index is a technique to quantify foot posture in the transverse, sagittal and frontal planes. Based on scoring 6 index items rated from -2 to +2.

The following are items which are assessed by FPI-6.

Talar head palpation

Supra and infra curvature at the lateral malleoli

Calcaneal frontal plane position
Bulging in the region of the talonavicular joint
Height and congruence of medial longitudinal arch
Abduction/adduction of the forefoot on the rear foot

Each of the component tests or observations are simply graded 0 for neutral, with score of -2 for clear sign of supination and +2 for clear sign of pronation.5)

There are majority of studies on prevalence of flat foot conducted on obsessed children’s but there is dearth in literature on obsessed adult, in spite of that we can say that there is no literature available on flat foot in a school teachers. The work profile of teachers is in standing position. While standing, pressure from gravity multiplies the body weight on each foot, by 3 or 4 times. With the passing of time, muscle imbalance may result in an abnormality in the foot’s natural arch. The arch of a metatarsal may become flat due to access weight or stress from pounding on surface. Hence this study was undertaken to find out occurrence of flat foot in GRADE I obsessed teachers.

METHOD

Source of Data: The data was collected from high school in Mumbai

Study Design: A Cross Sectional Study

Sampling design and sampling allocation: Probability sampling, convenience sampling.

PROCEDURE

An ethical clearance was obtained from the institutional ethical committee, the purpose of the study was explained and a written informed consent was obtained from all patients recruited in the study. The total of 30 Teachers working in a school were screened as per inclusion criteria which is teachers working in high school more than 5 years who are willing to participate with BMI till stage I Obesity that is 31 to 34.99. The Participants were excluded if they had any signs for Congenital flat foot, Adult flexible flat foot, Posteriori tibial tendon dysfunction, Tarsal coalition, Personal Spastic flat foot, Latrogenic post traumatic arthritis, Neuromuscular flat foot, Pathological flat foot, Surgical treatment below ankle. Teachers working in a school were screened as per inclusion criteria. Before the study begun, the school authorities met, explain the purpose of the study and sought their consent. A written consent form was taken from all subjects. The procedure was explained to subject. Height and weight were measured on the subject in light cloths and without shoes using standard apparatus. To measure height, the measuring tape was fixed to the wall. Height was measured while the subject stood with heels, buttocks, shoulders and occipital touching the vertical tape. The head was held erect with the external auditory meat us and the lower border of the orbit in one horizontal plane. Firstly weight and height is measured and BMI is calculated. Then the subject foot is assessed/observed as per the FPI scale in standing position and foot was observed in a three direction by the therapist i.e. anterior, medial, posterior FPI was assessed using six criteria. Talar head palpation, Supra and infra curvature at the lateral malleoli, calcaneal frontal plane position, bulging in the region of the talonavicular joint, height and congruence of medial longitudinal arch, Abduction/adduction of the forefoot on the rear foot.

FINDINGS

The present study aimed to find out occurrence of flat foot in grade-I obsess teachers. The subjects consisted of 30 Grade-I obese teachers with a mean age of 39.9±7.2 years and a mean height of 156.7±4.8cm, mean weight 53.7±9.2 Kg with the mean BMI 33.33±11.2 Kg/m² which was showed in TABLE-1.

Our study that among selected grade-I obese teachers working more than 5 years, 53% are classified into pronated flat foot, while 17% are classified into supinated flat foot and 30% are classified into normal foot which showed in TABLE-2. The “PIA DIAGRAM” clearly shows that percentage of flat foot under different criteria. Green color shows percentage of supinated flatfoot, whereas red color shows that pronated flatfoot, and blue color shows that normal foot.

<table>
<thead>
<tr>
<th>TABLE-1 GENERAL CHARACTERISTICS OF THE STUDY SUBJECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (Years)</td>
</tr>
<tr>
<td>Weight (Kg)</td>
</tr>
<tr>
<td>Height (cm)</td>
</tr>
<tr>
<td>BMI (Kg/m²)</td>
</tr>
</tbody>
</table>
TABLE-2 SHOWING OCCURRENCE OF FLAT FOOT

<table>
<thead>
<tr>
<th>No of subject with score</th>
<th>No of subject with score</th>
<th>No of subject with score</th>
<th>No of subject with score</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to +5 (normal)</td>
<td>+6 to +9 (pronated)</td>
<td>-1 to -4 (supinated)</td>
<td>-5 to -12 (Highly supinated)</td>
<td></td>
</tr>
<tr>
<td>No of subjects</td>
<td>9</td>
<td>16</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Percentage (%)</td>
<td>30</td>
<td>53.33</td>
<td>16.66</td>
<td>0</td>
</tr>
</tbody>
</table>

DISCUSSION

The present study aimed to find out occurrence of flat foot in grade-I obese teachers which shows that 53% Grade-I obese teachers comes under B/L pronated flat foot, while 17% Grade-I obese teachers comes under B/L supinated flat foot and 30% comes under B/L normal foot. This indicates that more Grade-I obese teachers comes under pronated flat foot as compare to supinated flat foot and normal foot.

Occurrence of pronated flat foot was high that is 53% which may be due to prolong standing work. As literature shows that pronation is a normal part of walking, standing or running. When the outside of edge of our heel hits the ground, it supinates-or-locks- to deal with shockwave. Our foot then rolls in bit and our heel moves outward. Together, these actions cause you to pronate-or unlock. Pronation helps you absorb shock and adapt to uneven surfaces. (6)

Occurrence of supinated flat foot was low that is 17% which may be due to lack of lateral weight bearing or due to loss of medial arch. It was also seen in previous studies that supination, or under-pronation, is common among people with high arches or tight Achilles tendons (the stretchy bands of tissue that connect your calf muscles to your heels). Supination is considered natural for some people, but it places extra stress on your foot and leg that can cause problems elsewhere. That’s because the shockwave from your heel strike isn’t absorbed properly and the outside of your foot bears the full force of our step’s impact. (6)

The result of the present study not only support the notion that increased adiposity is associated with flatter feet, It highlight that the foot structure can be affected by overweight and obesity as early as they work in a standing position. Furthermore this is the first investigation to show that Grade-I obese teachers, display greater mid foot contact with the ground. It must be acknowledged however that the higher arch index only indicates the presence of an increased mid foot surface contact area and not the direct mechanism causing this increased contact(5).

In the static condition increased mass, weather it is temporary or long term (obesity) because the greater pick forces to be exerted on the soles of the feet of an obese adults while they were standing. Although a significant obesity was found for the static pick areas, increasing mass temporarily in the loaded condition did not significantly alter the pick contact area between the plantar surface of the feet and the platform during static trial. (8)

The fact that obese adult displays a stronger tendency towards flat foot are also documented in the literature. The opposite result was obtained by the Evans in the examination of 140 adult. Beside a connection was observed between the increased in a body weight and increased in a flat foot. (9)

Our survey shows that the increase in body weight influences the foot arches. The relationship between the MLA and BMI was positive and statically significant. (10)

CONCLUSION

This study concludes that 53% grade-I obese teacher have pronated flat foot while 17% have supinated flat foot and 33% have normal foot. So the present study indicates that there are more Grade-I obese teachers comes under pronated flat foot as compare to supinated flat foot and normal foot.

Conflict of Interest: None

Source of Support: Self
REFERENCES


Comparison between Non-VAP and VAP Patients with Acquired Brain Injury those were Admitted in Intensive Care Unit

Sachin Aggarwal¹, S K Luhadia², Pallav Bhatnagar³, Mundendra Goyal⁴

¹Head Department of Physiotherapy Solanki hospital, Alwar (Rajasthan), ²Professor & Head, Department of T.B & Chest Disease, Geetanjali University, Udaipur (Rajasthan), ³Principal, Geetanjali College of Physiotherapy, Geetanjali University, Udaipur (Rajasthan), ⁴Senior Consultant & ICU Incharge, Solanki Hospital, Alwar (Rajasthan)

ABSTRACT

The study included theoretical rationale of the respiratory physiotherapy is to improve airway clearance and enhance ventilation which may reduce the incidence of pulmonary infections and thus ventilator-associated pneumonia, and may in turn decrease the duration of mechanical ventilation, prevent the need for tracheostomy and hence result in reduced costs and shorter hospital stay of 80 patients. Although respiratory physiotherapy may be beneficial in preventing ventilator-associated pneumonia, to date there are data concerning the effectiveness of respiratory physiotherapy in patients with acquired brain injury. Hence from an evidence-based perspective, at present there is justification for the role of respiratory physiotherapy in the management of patients with acquired brain injury in the intensive care unit.

Keywords: Ventilator associated pneumonia, Respiratory Physiotherapy, Acquired brain injury, Intensive care patients

INTRODUCTION

Ventilator-associated pneumonia is a frequent and severe complication occurring in patients treated with mechanical ventilation (MV). Pneumonia results from microbial invasion of the normally sterile lower respiratory tract. The majority of infections appear to result from aspiration of potential pathogens that have colonised the oropharyngeal airway.¹ Once present, VAP is known to increase the duration of MV, time in the ICU, and length of hospital stay. There is a substantial cohort of patients admitted to ICU following ABI that may acquire VAP, which could potentially impact on ICU outcomes. It has been widely demonstrated that VAP results in significant increased costs to the health care system, and patients with VAP have an increased risk of morbidity and mortality arising from an episode of VAP, particularly in the presence of an ABI.²

Respiratory physiotherapy interventions are a relatively inexpensive and widely available management strategy that may benefit patients in the ICU by influencing the incidence of VAP and its associated morbidity. Theoretically, respiratory physiotherapy aims to improve airway clearance and enhance ventilation which may reduce the incidence of pulmonary infections and thus VAP.³ Thus, respiratory physiotherapy may decrease the duration of MV, prevent the need for tracheostomy and hence result in reduced costs and shorter hospital stay. Conversely it has been shown that respiratory physiotherapy may cause marked changes, albeit temporary, in intracranial and haemodynamic variables in patients with ABI.⁴ To date there are data concerning the effectiveness of respiratory physiotherapy in preventing or treating the pulmonary conditions occurring in patients with ABI admitted to the ICU. The intention of this study was to provide justification for the role of respiratory physiotherapy in preventing and
treating VAP for patients with ABI in ICU.5

AIM: This study aimed to provide the first comprehensive objective evaluation of the effectiveness of respiratory physiotherapy services for patients admitted to the ICU with ABI by:

• Investigating the clinical effectiveness and cost effectiveness of respiratory physiotherapy interventions in altering the incidence of VAP and other important clinical outcomes, such as duration of MV and length of ICU stay.

• Providing justification of respiratory physiotherapy service provision to the ICU in terms of clinical effectiveness and cost effectiveness for patients with VAP following ABI.

• Providing validation of the required level of respiratory physiotherapy services and staffing in the ICU based on clinical outcomes.

MATERIAL & METHOD

A prospective randomized trial was undertaken to investigate the effects of respiratory physiotherapy on the incidence and resolution of VAP in patients admitted with ABI to the ICU at SH. The aim of Part A of the study was to establish if the provision of regular prophylactic respiratory physiotherapy interventions, in addition to routine medical and nursing care, influenced the incidence of VAP. In Part of A this study subjects were randomised to one of the following two group:

Group 1 Male: Male patients according to inclusion criteria 24-hour respiratory physiotherapy service (six interventions approximately every four hours throughout the day and night) in addition to routine medical and nursing care and daily passive movements.

Group 2 Female: Female patients according to inclusion criteria 24-hour respiratory physiotherapy service (six interventions approximately every four hours throughout the day and night) in addition to routine medical and nursing care and daily passive movements.

The aim of Part B of the study was to establish if the provision of a regimen of regular respiratory physiotherapy, in addition to routine medical and nursing care, influenced the progression and/or resolution of VAP.

Subjects from Part A who developed VAP, based on criteria as outlined in Dependent variables, were transferred to Part B of the study.

Group 3 Male: Male patients according to inclusion criteria 24-hour respiratory physiotherapy service (six interventions approximately every four hours throughout the day and night) in addition to routine medical and nursing care and daily passive movements.

Group 4 Female: Female patients according to inclusion criteria 24-hour respiratory physiotherapy service (six interventions approximately every four hours throughout the day and night) in addition to routine medical and nursing care and daily passive movements.

SUBJECTS

Patients admitted to the ICU at SH following an ABI who satisfied the inclusion criteria were eligible for participation in the study.

1 Inclusion criteria

• Inclusion criteria comprised meeting all of the following:

  • Aged 16 years or older
  • GCS less than or equal to (≤) nine on admission to the ICU
  • Presence of an ICP monitor or drain
  • Invasive mechanical ventilatory support for greater than (>) 24 hours
  • Eligible subjects were prospectively randomised to a study group on admission to the SH ICU.

2 Exclusion criteria

• Exclusion criteria comprised at least one of the following:

  • Patients not for active therapy
  • Patients with excessive respiratory support requirements, defined as: nitric oxide ventilation, - fraction of inspired oxygen [FiO2] > 0.8, - and/or positive end expiratory pressure [PEEP] > 10 centimetres of water [cmH2O].
  • Patients with any of these criteria would not receive MH, as per SH ICU standard operating
policy, and may have limited positioning and airway suctioning due to concerns regarding excessive oxygen consumption.

- Patients with unstable haemodynamic status, defined as:
  - MAP [in millimetres of Mercury (mmHg)] > 120 or < 60
  - and/or HR (in beats per minute) > 120 or < 60
  - labile MAP or HR
  - presence of new cardiac arrhythmias requiring definitive intervention
  - excessive inotropic support requirements i.e. noradrenaline or adrenaline infusion at > 30 milligrams per hour.

RESULT

Table 1: Comparison between subjects with and without ventilator-associated pneumonia

<table>
<thead>
<tr>
<th>Variables</th>
<th>Group 1 Male (N=50)</th>
<th>Group 2 Female (N=30)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (Years)</td>
<td>47.2 ± 16.6</td>
<td>52.5 ± 16.2</td>
<td>0.1693</td>
</tr>
<tr>
<td>Gender (Male / Female)</td>
<td>50 (62.5%)</td>
<td>30 (37.5%)</td>
<td></td>
</tr>
<tr>
<td>Race</td>
<td>Asian</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BMI (Kg/m²)</td>
<td>25.7 ± 3.4</td>
<td>23.8 ± 3.0</td>
<td>0.0151</td>
</tr>
<tr>
<td>GCS</td>
<td>4.7 ± 1.3</td>
<td>4.9 ± 1.3</td>
<td>0.4604</td>
</tr>
</tbody>
</table>

The following section provides comparison between those subjects with and without VAP, based on intention to treat philosophy. Subjects with a VAP were significantly male, were admitted with a lower GCS. Duration of MV and length of ICU stay were significantly increased in subjects with VAP, and there was a trend for increased length of hospital stay but wide variability.

Table 2: Comparison of duration of mechanical ventilation and length of stay for the non-VAP and VAP subjects

<table>
<thead>
<tr>
<th>Variable</th>
<th>Non VAP Subjects (N=63)</th>
<th>VAP Subjects (N=17)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration of MV (Days)</td>
<td>3.0 ± 1.2</td>
<td>4.1 ± 1.3</td>
<td>0.0022</td>
</tr>
<tr>
<td>Length of ICU Stay (Days)</td>
<td>± 2.7</td>
<td>9.1 ± 3.5</td>
<td>0.0000</td>
</tr>
<tr>
<td>Length of Hospital Stay (Days)</td>
<td>5.6 ± 3.3</td>
<td>9.6 ± 5.6</td>
<td>0.0003</td>
</tr>
</tbody>
</table>

FINDINGS

This prospective randomised trial investigated the effect of regular prophylactic respiratory physiotherapy on the incidence of VAP, duration of MV, and length of ICU stay in adults with ABI.6 The validity of the results of this study may have been influenced by the study design, treatment regimen, clinical stability of the subjects, control of sedation, ventilation and cough (which will influence airway clearance), the use of incidence of VAP, duration of MV and length of ICU stay as outcome measures, and the power of the study to detect a difference in the study. These aspects of the study methodology are discussed within the following section.7

Use of a regular prophylactic respiratory physiotherapy regimen, repeated six times per day and comprising of positioning, MH and suctioning appeared to prevent VAP, reduce duration of MV or length of ICU stay in adults with ABI. For subjects with ABI receiving this regimen of physiotherapy in ICU (for their entire duration of MV), in an attempt to prevent VAP.8

In adult ABI subjects with VAP, use of a regular respiratory physiotherapy regimen, repeated six times per day and comprising of positioning, MH and suctioning expedited recovery in terms of reducing length of MV or ICU stay. On statistical results alone it would appear that there is role within clinical practice for the respiratory physiotherapy regimen utilised in this study for subjects with ABI.9

CONCLUSION

The main conclusion from this study was that the use of a regular prophylactic respiratory physiotherapy
regimen comprising of positioning, MH and suctioning in addition to routine medical and nursing care, appeared to prevent VAP, reduce duration of MV or length of ICU stay in adults with ABI. Within the ICU at SH. For patients with ABI receiving this prophylactic regimen of respiratory physiotherapy in ICU (six times per day for their entire duration of MV), in an attempt to prevent VAP.

Subjects with a VAP were significantly male, were admitted with a lower GCS. Duration of MV and length of ICU stay were significantly increased in subjects with VAP, and there was a trend for increased length of hospital stay but wide variability.

Conflict of Interest: Nil

Source of Funding: Self

Ethical Clearance: Taken from “Solanki Hospital Institutional Ethics Committee”.

REFERENCES


Effectiveness of Prophylactic Respiratory Physiotherapy in Reducing the Mechanical Ventilation Stay of Patients with Acquired Brain Injury in Intensive Care Unit

Sachin Aggarwal¹, S. K Luhadia², Pallav Bhatnagar³, Mundendra Goyal⁴
¹Head Department of Physiotherapy, Solanki hospital, Alwar (Rajasthan), ²Professor & Head, Department of T.B & Chest Disease, Geetanjali University, Udaipur (Rajasthan), ³Principal, Geetanjali College of Physiotherapy, Geetanjali University, Udaipur (Rajasthan), ⁴Senior Consultant & ICU Incharge, Solanki Hospital, Alwar (Rajasthan)

ABSTRACT

The study included theoretical rationale of the respiratory physiotherapy is to improve airway clearance and enhance ventilation which may reduce the incidence of pulmonary infections and thus ventilator-associated pneumonia, and may in turn decrease the duration of mechanical ventilation, prevent the need for tracheostomy and hence result in reduced costs and shorter hospital stay of 80 patients. Although respiratory physiotherapy may be beneficial in preventing ventilator-associated pneumonia, to date there are data concerning the effectiveness of respiratory physiotherapy in patients with acquired brain injury. Hence from an evidence-based perspective, at present there is justification for the role of respiratory physiotherapy in the management of patients with acquired brain injury in the intensive care unit.

Key words: Ventilator associated pneumonia, Respiratory Physiotherapy, Acquired brain injury, Intensive care patients

INTRODUCTION

Ventilator-associated pneumonia is a frequent and severe complication occurring in patients treated with mechanical ventilation (MV). Pneumonia results from microbial invasion of the normally sterile lower respiratory tract. The majority of infections appear to result from aspiration of potential pathogens that have colonised the oropharyngeal airway.¹ Once present, VAP is known to increase the duration of MV, time in the ICU, and length of hospital stay. There is a substantial cohort of patients admitted to ICU following ABI that may acquire VAP, which could potentially impact on ICU outcomes. It has been widely demonstrated that VAP results in significant increased costs to the health care system, and patients with VAP have an increased risk of morbidity and mortality arising from an episode of VAP, particularly in the presence of an ABI.²

Respiratory physiotherapy interventions are a relatively inexpensive and widely available management strategy that may benefit patients in the ICU by influencing the incidence of VAP and its associated morbidity. Theoretically, respiratory physiotherapy aims to improve airway clearance and enhance ventilation which may reduce the incidence of pulmonary infections and thus VAP.³ Thus, respiratory physiotherapy may decrease the duration of MV, prevent the need for tracheostomy and hence result in reduced costs and shorter hospital stay. Conversely it has been shown that respiratory physiotherapy may cause marked changes, albeit temporary, in intracranial and haemodynamic variables in patients with ABI.⁴ To date there are data concerning the effectiveness of respiratory physiotherapy in preventing or treating the pulmonary conditions occurring in patients with ABI admitted to the ICU. The intention of this study was to provide justification for the role of respiratory physiotherapy in preventing and treating VAP for patients with ABI in ICU.⁵

Corresponding author:
Dr. Sachin Aggarwal (PT),
Head, Department of Physiotherapy, Solanki Hospital, 10, Ram Kutir, Alwar, Rajasthan-301001.
e-mail: sachinphd2015@rediffmail.com

DOI Number: 10.5958/0973-5674.2018.00095.3
AIM

This study aimed to provide the first comprehensive objective evaluation of the effectiveness of respiratory physiotherapy services for patients admitted to the ICU with ABI by:

• Investigating the clinical effectiveness and cost effectiveness of respiratory physiotherapy interventions in altering the incidence of VAP and other important clinical outcomes, such as duration of MV and length of ICU stay.

• Providing justification of respiratory physiotherapy service provision to the ICU in terms of clinical effectiveness and cost effectiveness for patients with VAP following ABI.

• Providing validation of the required level of respiratory physiotherapy services and staffing in the ICU based on clinical outcomes.

MATERIAL & METHOD

A prospective randomized trial was undertaken to investigate the effects of respiratory physiotherapy on the incidence and resolution of VAP in patients admitted with ABI to the ICU at SH. The aim of Part A of the study was to establish if the provision of regular prophylactic respiratory physiotherapy interventions, in addition to routine medical and nursing care, influenced the incidence of VAP. In this study subjects were randomised to one of the following two group:

Group 1 Male: Male patients according to inclusion criteria 24-hour respiratory physiotherapy service (six interventions approximately every four hours throughout the day and night) in addition to routine medical and nursing care and daily passive movements.

Group 2 Female: Female patients according to inclusion criteria 24-hour respiratory physiotherapy service (six interventions approximately every four hours throughout the day and night) in addition to routine medical and nursing care and daily passive movements.

SUBJECTS

Patients admitted to the ICU at SH following an ABI who satisfied the inclusion criteria were eligible for participation in the study.

1. Inclusion criteria

Inclusion criteria comprised meeting all of the following:

• Aged 16 years or older
• GCS less than or equal to (≤) nine on admission to the ICU
• Presence of an ICP monitor or drain
• Invasive mechanical ventilatory support for greater than (> ) 24 hours

Eligible subjects were prospectively randomised to a study group on admission to the SH ICU.

2. Exclusion criteria

• Exclusion criteria comprised at least one of the following:
• Patients not for active therapy
• Patients with excessive respiratory support requirements, defined as:
• nitric oxide ventilation, - fraction of inspired oxygen [FiO2] > 0.8, - and/or positive end expiratory pressure [PEEP] > 10 centimetres of water [cmH2O].
• Patients with any of these criteria would not receive MH, as per SH ICU standard operating policy, and may have limited positioning and airway suctioning due to concerns regarding excessive oxygen consumption.
• Patients with unstable haemodynamic status, defined as:
• MAP [in millimetres of Mercury (mmHg)] > 120 or < 60
• and/or HR (in beats per minute) > 120 or < 60 labile MAP or HR
• presence of new cardiac arrhythmias requiring definitive intervention
• excessive inotropic support requirements i.e. noradrenaline or adrenaline infusion at > 30 milligrams per hour.
RESULT

Table-1 Demographic Characteristics of the 80 Subjects of the study

<table>
<thead>
<tr>
<th>Variables</th>
<th>Group 1 Male (N=50)</th>
<th>Group 2 Female (N=30)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (Years)</td>
<td>47.2 ± 16.6</td>
<td>52.5 ± 16.2</td>
<td>0.1693</td>
</tr>
<tr>
<td>Gender (Male / Female)</td>
<td>50 (62.5%)</td>
<td>30 (37.5%)</td>
<td></td>
</tr>
<tr>
<td>Race</td>
<td>Asian</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BMI (Kg/M²)</td>
<td>25.7 ± 3.4</td>
<td>23.8 ± 3.0</td>
<td>0.0151</td>
</tr>
<tr>
<td>GCS</td>
<td>4.7 ± 1.3</td>
<td>4.9 ± 1.3</td>
<td>0.4604</td>
</tr>
</tbody>
</table>

Table-2 Significant findings of prophylactic respiratory physiotherapy in reducing the MV stay of ABI patients those admitted in ICU

<table>
<thead>
<tr>
<th>Group</th>
<th>Group 1 Male</th>
<th>Group 2 Female</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>Min</td>
<td>Max</td>
<td>Mean</td>
</tr>
<tr>
<td>Duration of MV (Days)</td>
<td>50</td>
<td>1</td>
<td>6</td>
</tr>
</tbody>
</table>

FINDINGS

This prospective randomised trial investigated the effect of regular prophylactic respiratory physiotherapy on the incidence of VAP, duration of MV, and length of ICU stay in adults with ABI. The validity of the results of this study may have been influenced by the study design, treatment regimen, clinical stability of the subjects, control of sedation, ventilation and cough (which will influence airway clearance), the use of incidence of VAP, duration of MV and length of ICU stay as outcome measures, and the power of the study to detect a difference in the study. These aspects of the study methodology are discussed within the following section.

Use of a regular prophylactic respiratory physiotherapy regimen, repeated six times per day and comprising of positioning, MH and suctioning appeared to prevent VAP, reduce duration of MV or length of ICU stay in adults with ABI. For subjects with ABI receiving this regimen of physiotherapy in ICU (for their entire duration of MV), in an attempt to prevent VAP. In adult ABI subjects with VAP, use of a regular respiratory physiotherapy regimen, repeated six times per day and comprising of positioning, MH and suctioning expedited recovery in terms of reducing length of MV or ICU stay. On statistical results alone it would appear that there is role within clinical practice for the respiratory physiotherapy regimen utilised in this study for subjects with ABI.

CONCLUSION

The main conclusion from this study was that the use of a regular prophylactic respiratory physiotherapy regimen comprising of positioning, MH and suctioning in addition to routine medical and nursing care, appeared to prevent VAP, reduce duration of MV or length of ICU stay in adults with ABI. Within the ICU at SH. For patients with ABI receiving this prophylactic regimen of respiratory physiotherapy in ICU (six times per day for their entire duration of MV), in an attempt to prevent VAP.
Conflict of Intrest: Nil

Source of Funding: Self

Ethical Clearance: Taken from “Solanki Hospital Institutional Ethics Committee”.

REFERENCES


Find Out the Age Specific Items of Short Sensory Profile Filled up by the Caregivers of Indian Children with and without Autism Spectrum Disorder

Hetal Jagdishkumar Tripathi¹, Ranjeet Pathak², Amitabh Dwivedi³,
Titiksh Vijeshkumar Varma⁴, Krupa Babulal Prabhakar⁵

¹Occupational Therapist, Department of Occupational Therapy, Government Spine Institute, Civil Hospital Campus, Ahmedabad, Gujarat, India, ²Assistant Professor / Incharge, Occupation Therapy College, IAHSET, Government Medical College, Haldwani, Nainital, Uttarakhand, India, ³Principal, HOD and Professor of Jaipur Occupational Therapy College, MaharajVinayak Global University, Dhand, Amer, Jaipur, Rajasthan, India, ⁴Occupational Therapist, Department of Occupational Therapy, Civil Hospital, Asarwa, Ahmedabad, Gujarat, India, ⁵Physiotherapist Tutor, Trauma Center, Civil Hospital, Asarwa, Ahmedabad, Gujarat, India

ABSTRACT

The purpose of the study was to find out the most common behaviours/items for the age groups 3 years, 4 years, 5-10 years from each sections of SSP that can be useful to differentiate children with ASD from children without ASD among Indian population with the help of the caregivers of the children. Age and Gender matched 50 children with and without ASD were approached on different platforms and incorporated in the study on the basis of inclusion and exclusion criteria of the study. The items were identified and compared between the groups. These behaviours play a major role in diagnosis of children with ASD because they have been developed for all the age-groups. The sample does not represent the entire population of children with ASD and without ASD of the specific age group; therefore the study can be done with a larger sample size. From this study, it has been concluded that these items can be used to understand sensory processing abilities of children with ASD which can be really very helpful to caregivers and occupational therapists in assessing and programme planning.

Keywords: ASD- Autism Spectrum Disorder, SSP- Short Sensory Profile

INTRODUCTION

ASD is characterized by persistent deficits in social communication and social interaction across multiple contexts, including deficits in social reciprocity, nonverbal communicative behaviors used for social interaction, and skills in developing, maintaining, and understanding relationships. In addition to the social communication deficits, the diagnosis of ASD requires the presence of restricted, repetitive patterns of behavior, interests, or activities.[¹][²] Symptoms typically are apparent before age 3 years.[³]

Need of the study: To find out the most common age specific behaviours/items from each sections of SSP for the age-groups 3 years, 4 years and 5-10 years that can be useful to differentiate children with ASD from children without ASD among Indian population.

METHODOLOGY

Study Design: Quantitative observational study

Target Population: Children with ASD and Children without ASD

Study Setting: Ahmedabad

Sample Size: Children with ASD (50) and children without ASD (50) (Age and Gender matched)

Sampling method: Quota Sampling
Codes of Ethics:

• Permission was taken before filling up the form and written consent was taken in the form.

• Any personal information of the children and parents will not be disclosed.

Inclusion criteria:

• For children with ASD group-
  • Age within the specific range (3-10 years) (3 years= 3 years and 0 Months, 10 years= 10 years and 11 months)
  • Children diagnosed with ASD by pediatricians or child psychiatrists on DSM-V criteria

For children without ASD group-

• Age within the specific range (3-10 years)

• Absence of a diagnosed medical condition that might compromise the development of children (e.g: Mental Retardation, Learning Disabilities, Down syndrome, Cerebral palsy, ADHD)

• No children with Preterm birth (Preterm birth required gestation age of 34 weeks or less and birth weight under 2500 gms) \(^4\)

• No genetic history with ASD\(^5\)

• Exclusion criteria:

For children with and without ASD:

• Uncooperative/ Unresponsive caregivers (Parents and family members)

• The children below the age of 3 years and above 10 years.

• The caregivers who does not understand the English language

• Caregivers (Parents and family members) who do not spend minimum 12 hours (except sleeping hours) a day with the child.

For children without ASD group-

• The children who are on medications for any condition

• The children who have any other disability

METHOD

Phase-1

Ahmedabad is divided into 5 zones. 1) East zone 2) West zone 3) North zone 4) South zone 5) Central zone. The data of 10 children with ASD and 10 children without ASD were collected from each zone. In this way, the data of 50 children with ASD and 50 children without ASD were collected from whole Ahmedabad.

Phase-2

For children with ASD: 8 NGOs/Private Clinics/Hospitals/Trusts/Special Schools were approached for collecting the data. 86 children’s data were received but only 50 children (3 Years- 4 Boys + 2 Girls, 4 Years- 3 Boys + 2 Girls, 5-10 Years- 29 Boys + 10 Girls) were selected from them and rest 36 were eliminated due to different issues like 4 of them were not within the specific age range (3-10 years), 6 Children were not fitted in the guidelines of DSM-V, caregivers of 14 children were uncooperative/ unresponsive or they did not show interest in responding properly, 6 children were having other disabilities (3 children with Mental retardation, 2 children with learning disabilities and 1 child with preterm birth), 3 children were taking drugs for epileptic condition, 3 caregivers of children do not understand English language.

For children without ASD: The aim was clear to collect the age and gender matched data of normal children. 5 Normal schools of 5 regions were approached for data collection purpose and 85 data of children were received. From those 85 children, 35 children were excluded as they were meeting the exclusion criteria (7 children were on medication, 15 children were out of age specific range, 3 caregivers of children do not understand English language and 10 children had uncooperative/ unresponsive or they did not show interest in responding properly) and only the data of 50 children were collected.

Purpose of the study was explained to the caregivers and written informed consent was taken. Detailed information of the children was taken from the caregivers. SSP and 5 point Likert Scale were explained to the caregivers well in advance before filling up the SSP. The caregivers marked each question and filled up the form.
**FINDINGS & DISCUSSION**

**Table-1 Data Distribution**

<table>
<thead>
<tr>
<th>Gender</th>
<th>3 Years</th>
<th>4 Years</th>
<th>5-10 Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boys</td>
<td>4 (8%)</td>
<td>3 (6%)</td>
<td>29 (58%)</td>
</tr>
<tr>
<td>Girls</td>
<td>2 (4%)</td>
<td>2 (4%)</td>
<td>10 (20%)</td>
</tr>
<tr>
<td>Total</td>
<td>6 (12%)</td>
<td>5 (10%)</td>
<td>39 (78%)</td>
</tr>
</tbody>
</table>

**Table-2 Percentage of behaviors frequency of each item for children with ASD**

<table>
<thead>
<tr>
<th>Age-Groups</th>
<th>3 Years</th>
<th>4 Years</th>
<th>5-10 Years</th>
<th>3-10 Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>33.33%</td>
<td>40.00%</td>
<td>64.10%*</td>
<td>58.00%*</td>
</tr>
<tr>
<td>2.</td>
<td>16.67%</td>
<td>60.00%*</td>
<td>23.08%</td>
<td>26.00%</td>
</tr>
<tr>
<td>3.</td>
<td>100.00%*</td>
<td>20.00%</td>
<td>64.10%*</td>
<td>64.00%*</td>
</tr>
<tr>
<td>4.</td>
<td>50.00%*</td>
<td>80.00%*</td>
<td>35.90%</td>
<td>42.00%</td>
</tr>
<tr>
<td>5.</td>
<td>16.67%</td>
<td>20.00%</td>
<td>12.82%</td>
<td>14.00%</td>
</tr>
<tr>
<td>6.</td>
<td>66.67%*</td>
<td>80.00%*</td>
<td>76.92%*</td>
<td>76.00%*</td>
</tr>
<tr>
<td>7.</td>
<td>33.33%</td>
<td>40.00%</td>
<td>28.21%</td>
<td>30.00%</td>
</tr>
<tr>
<td>8.</td>
<td>66.67%*</td>
<td>80.00%*</td>
<td>48.72%</td>
<td>54.00%*</td>
</tr>
<tr>
<td>9.</td>
<td>66.67%*</td>
<td>60.00%*</td>
<td>43.59%</td>
<td>48.00%</td>
</tr>
<tr>
<td>10.</td>
<td>66.67%*</td>
<td>80.00%*</td>
<td>48.72%</td>
<td>54.00%*</td>
</tr>
<tr>
<td>11.</td>
<td>66.67%*</td>
<td>80.00%*</td>
<td>43.59%</td>
<td>50.00%*</td>
</tr>
<tr>
<td>12.</td>
<td>50.00%*</td>
<td>40.00%</td>
<td>38.46%</td>
<td>40.00%</td>
</tr>
<tr>
<td>13.</td>
<td>50.00%*</td>
<td>80.00%*</td>
<td>51.28%</td>
<td>54.00%*</td>
</tr>
<tr>
<td>14.</td>
<td>50.00%*</td>
<td>40.00%</td>
<td>38.46%</td>
<td>40.00%</td>
</tr>
<tr>
<td>15.</td>
<td>50.00%*</td>
<td>40.00%</td>
<td>58.97%*</td>
<td>56.00%*</td>
</tr>
<tr>
<td>16.</td>
<td>100.00%*</td>
<td>100.00%*</td>
<td>84.62%*</td>
<td>88.00%*</td>
</tr>
<tr>
<td>17.</td>
<td>66.67%*</td>
<td>60.00%*</td>
<td>74.36%*</td>
<td>72.00%*</td>
</tr>
<tr>
<td>18.</td>
<td>50.00%*</td>
<td>60.00%*</td>
<td>66.67%*</td>
<td>64.00%*</td>
</tr>
<tr>
<td>19.</td>
<td>33.33%</td>
<td>60.00%*</td>
<td>43.59%</td>
<td>44.00%</td>
</tr>
<tr>
<td>20.</td>
<td>100.00%*</td>
<td>100.00%*</td>
<td>76.92%*</td>
<td>82.00%*</td>
</tr>
<tr>
<td>21.</td>
<td>50.00%*</td>
<td>20.00%</td>
<td>35.90%</td>
<td>36.00%</td>
</tr>
<tr>
<td>22.</td>
<td>33.33%</td>
<td>40.00%</td>
<td>64.10%*</td>
<td>62.00%*</td>
</tr>
<tr>
<td>23.</td>
<td>16.67%</td>
<td>40.00%</td>
<td>23.08%</td>
<td>24.00%</td>
</tr>
<tr>
<td>24.</td>
<td>16.67%</td>
<td>40.00%</td>
<td>30.77%</td>
<td>30.00%</td>
</tr>
<tr>
<td>25.</td>
<td>50.00%*</td>
<td>40.00%</td>
<td>54.41%*</td>
<td>54.00%*</td>
</tr>
<tr>
<td>26.</td>
<td>83.33%*</td>
<td>100.00%*</td>
<td>46.92%</td>
<td>80.00%*</td>
</tr>
<tr>
<td>27.</td>
<td>50.00%*</td>
<td>60.00%*</td>
<td>30.77%</td>
<td>36.00%</td>
</tr>
<tr>
<td>28.</td>
<td>16.67%</td>
<td>60.00%*</td>
<td>46.15%</td>
<td>44.00%</td>
</tr>
<tr>
<td>29.</td>
<td>33.33%</td>
<td>60.00%*</td>
<td>35.90%</td>
<td>38.00%</td>
</tr>
<tr>
<td>30.</td>
<td>16.67%</td>
<td>40.00%</td>
<td>33.33%</td>
<td>32.00%</td>
</tr>
</tbody>
</table>
**Table-2 Percentage of behaviors frequency of each item for children with ASD**

<table>
<thead>
<tr>
<th>32.</th>
<th>16.67%</th>
<th>20.00%</th>
<th>41.03%</th>
<th>36.00%</th>
</tr>
</thead>
<tbody>
<tr>
<td>33.</td>
<td>50.00**%</td>
<td>80.00**%</td>
<td>38.46%</td>
<td>44.00%</td>
</tr>
<tr>
<td>34.</td>
<td>50.00**%</td>
<td>80.00**%</td>
<td>46.15%</td>
<td>50.00%*</td>
</tr>
<tr>
<td>35.</td>
<td>50.00%*S</td>
<td>80.00%*S</td>
<td>61.54%*</td>
<td>62.00%*</td>
</tr>
<tr>
<td>36.</td>
<td>33.33%</td>
<td>20.00%</td>
<td>23.08%</td>
<td>24.00%</td>
</tr>
<tr>
<td>37.</td>
<td>66.67%*S</td>
<td>40.00%</td>
<td>48.72%</td>
<td>50.00%*</td>
</tr>
<tr>
<td>38.</td>
<td>66.67%*S</td>
<td>20.00%</td>
<td>28.21%</td>
<td>32.00%</td>
</tr>
</tbody>
</table>

* shows Always, Frequently and Occasionally $ shows Always & Frequently

**Table-3 Percentage of behaviors frequency of each item for children without ASD**

<table>
<thead>
<tr>
<th>Age-Groups</th>
<th>3 Years</th>
<th>4 Years</th>
<th>5-10 Years</th>
<th>3-10 Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>16.67%</td>
<td>60.00%*</td>
<td>23.08%</td>
<td>26.00%</td>
</tr>
<tr>
<td>2.</td>
<td>33.33%</td>
<td>0.00%</td>
<td>46.15%</td>
<td>40.00%</td>
</tr>
<tr>
<td>3.</td>
<td>66.67%*</td>
<td>80.00%*</td>
<td>46.15%</td>
<td>52.00%*</td>
</tr>
<tr>
<td>4.</td>
<td>16.67%</td>
<td>80.00%*</td>
<td>43.59%</td>
<td>44.00%</td>
</tr>
<tr>
<td>5.</td>
<td>0.00%</td>
<td>40.00%</td>
<td>35.90%</td>
<td>32.00%</td>
</tr>
<tr>
<td>6.</td>
<td>0.00%</td>
<td>60.00%*</td>
<td>30.77%</td>
<td>30.00%</td>
</tr>
<tr>
<td>7.</td>
<td>16.67%</td>
<td>20.00%</td>
<td>23.08%</td>
<td>22.00%</td>
</tr>
<tr>
<td>8.</td>
<td>16.67%</td>
<td>60.00%*</td>
<td>43.59%</td>
<td>42.00%</td>
</tr>
<tr>
<td>9.</td>
<td>33.33%</td>
<td>40.00%</td>
<td>43.59%</td>
<td>42.00%</td>
</tr>
<tr>
<td>10.</td>
<td>50.00%*</td>
<td>60.00%*</td>
<td>48.72%</td>
<td>50.00%*</td>
</tr>
<tr>
<td>11.</td>
<td>50.00%*</td>
<td>60.00%*</td>
<td>46.15%</td>
<td>48.00%</td>
</tr>
<tr>
<td>12.</td>
<td>16.67%</td>
<td>40.00%</td>
<td>41.03%</td>
<td>38.00%</td>
</tr>
<tr>
<td>13.</td>
<td>50.00%*</td>
<td>40.00%</td>
<td>28.21%</td>
<td>32.00%</td>
</tr>
<tr>
<td>14.</td>
<td>50.00%*</td>
<td>40.00%</td>
<td>23.08%</td>
<td>28.00%</td>
</tr>
<tr>
<td>15.</td>
<td>16.67%</td>
<td>40.00%</td>
<td>43.59%</td>
<td>40.00%</td>
</tr>
<tr>
<td>16.</td>
<td>33.33%</td>
<td>40.00%</td>
<td>41.03%</td>
<td>40.00%</td>
</tr>
<tr>
<td>17.</td>
<td>16.67%</td>
<td>60.00%*</td>
<td>69.23%</td>
<td>62.00%*</td>
</tr>
<tr>
<td>18.</td>
<td>33.33%</td>
<td>40.00%</td>
<td>51.28%*</td>
<td>48.00%</td>
</tr>
<tr>
<td>19.</td>
<td>16.67%</td>
<td>20.00%</td>
<td>41.03%</td>
<td>36.00%</td>
</tr>
<tr>
<td>20.</td>
<td>66.67%</td>
<td>40.00%</td>
<td>46.15%</td>
<td>48.00%</td>
</tr>
<tr>
<td>21.</td>
<td>0.00%</td>
<td>40.00%</td>
<td>23.08%</td>
<td>22.00%</td>
</tr>
<tr>
<td>22.</td>
<td>50.00%*</td>
<td>60.00%*</td>
<td>41.03%</td>
<td>44.00%</td>
</tr>
<tr>
<td>23.</td>
<td>50.00%*</td>
<td>0.00%</td>
<td>35.90%</td>
<td>34.00%</td>
</tr>
<tr>
<td>24.</td>
<td>0.00%</td>
<td>40.00%</td>
<td>20.51%</td>
<td>20.00%</td>
</tr>
<tr>
<td>25.</td>
<td>50.00%*</td>
<td>0.00%</td>
<td>25.64%</td>
<td>26.00%</td>
</tr>
<tr>
<td>26.</td>
<td>33.33%</td>
<td>40.00%</td>
<td>33.33%</td>
<td>34.00%</td>
</tr>
<tr>
<td>27.</td>
<td>33.33%</td>
<td>20.00%</td>
<td>20.51%</td>
<td>22.00%</td>
</tr>
<tr>
<td>28.</td>
<td>0.00%</td>
<td>40.00%</td>
<td>10.26%</td>
<td>12.00%</td>
</tr>
<tr>
<td>29.</td>
<td>16.67%</td>
<td>20.00%</td>
<td>20.51%</td>
<td>20.00%</td>
</tr>
<tr>
<td>30.</td>
<td>0.00%</td>
<td>0.00%</td>
<td>2.56%</td>
<td>2.00%</td>
</tr>
<tr>
<td>31.</td>
<td>0.00%</td>
<td>20.00%</td>
<td>17.95%</td>
<td>16.00%</td>
</tr>
<tr>
<td>32.</td>
<td>0.00%</td>
<td>60.00%*</td>
<td>28.21%</td>
<td>28.00%</td>
</tr>
<tr>
<td>33.</td>
<td>0.00%</td>
<td>20.00%</td>
<td>12.82%</td>
<td>12.00%</td>
</tr>
</tbody>
</table>
Identified items for Children with ASD:

Common behaviors have been analyzed and identified by applying Dunn’s criterion (1994). Children reflect the frequency of behavior either always, frequently or occasionally.[6]

Children with ASD do these sensory behaviors more than 50% of the time (always, frequently & occasionally). The questions have been analyzed and identified for the particular age-groups because Dunn developed different cut scores for 3 years, 4 years and 5-10 year while developing SP as she quoted during her researches that the young children are having more sensory issues than older ones. The researcher found that the number of questions/behaviors decrease with the growing age. It shows that the children with ASD reduce their sensory issues with developing Age[5] like for 3 years (25), 4 years (20), 5-10 years (13) These list of behaviors will be very useful for the therapists and caregivers to understand the child according to his/her age and not to get confused with the rest of the behaviors as the data is showing the sensory behaviors for the particular age-groups.

In the Age-group of 3-10 years, highest frequency of occurrence is 88% and this have happened with only one item, Q-16- Seeks all kind of movement and this interferes with daily routine activities. It is very common for children with ASD and uncommon for children without ASD.

The finding that no items on the SSP were reported at 90% occurrence rate supports the notion that children with ASD demonstrate a wide spectrum of functional abilities. Due to those varying patterns of the behaviors, the therapist has noted “Always, Frequently and occasionally” frequency because one child with ASD may engage in a behavior listed on the SSP frequently, yet another child with ASD may not demonstrate that behavior at all, resulting in a different distribution of responses across Items. To reduce these kinds of consequences, the researcher has analyzed the behavior data belongs to all three categories (always, frequently & occasionally) instead of two categories (always and frequently). The findings suggest that the distribution of responses (frequency of behavior occurrence) is different for children with ASD even on the items that are somewhat common for children without ASD.

Identified Items for Children without ASD:

<table>
<thead>
<tr>
<th>3 Years:</th>
<th>4 Years:</th>
<th>5-10 Years</th>
<th>3-10 Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q-3,Q-4,Q-6,Q-8,Q-9,Q-10,Q-11,Q-12,Q-13,Q-14,Q-15,Q-16,Q-17,Q-18,Q-20,Q-21,Q-23,Q-26,Q-27,Q-28,Q-33,Q-34,Q-35,Q-37,Q-38</td>
<td>Q-2,Q-4,Q-6,Q-8,Q-9,Q-10,Q-11,Q-13,Q-16,Q-17,Q-18,Q-19,Q-20,Q-27,Q-28,Q-29,Q-30,Q-33,Q-34,Q-35</td>
<td>Q-1,Q-3,Q-6,Q-13,Q-15,Q-16,Q-17,Q-18,Q-20,Q-22,Q-23,Q-26,Q-35</td>
<td>Q-6,Q-16,Q-18,Q-20,Q-27</td>
</tr>
</tbody>
</table>

*shows above 50% (Occasionally)
The same behaviors done by children with ASD also but these items do not show significant difference hence these behaviors may be the common behaviors for both the groups but not the best items to discriminate due to lack of significance. It shows that the same behaviors have been performed by both the groups which support that the children with and without ASD exhibit some degree of sensory dysfunction which is grater in children with ASD than children without ASD. As noticed by the researcher, these behaviors reduce with developing Age[5]like for 3 years (12), 4 years (11), 5-10 years (2) these results supports the study done by Dunn that the younger children have more sensory issues than older children.[6]

However, this study finding suggests that the distribution of responses is different for children with ASD, even on items those are somewhat common for children without ASD. For example, Q-3 Avoids going barefoot, especially in grass or sand, Q-10 Limits self to particular food textures/temperatures Q-17 Becomes overly excitable during a movement activity Q-37 Watches everyone when they move around the room. These behaviors were considered common for children without ASD are also common for children with ASD, yet the frequency distribution was still significantly different between the groups. This is important to note because despite the fact that children with and without ASD engage in the same behavior frequently, their performances are still different.[7]

These common behaviors are not likely to be appropriate items for a test of sensory processing problems. If a child displays one or more of these behaviors, the therapist would not know whether the behaviors are present as a result of typical development or because of dysfunction. Further consideration suggests that these items may have been suggested a desirable trait to a parent.[8] For example- a therapist might consider a child who “watches everyone when they move around the room” as distractible whereas a parent might perceive this behavior as exhibiting curiosity. These variations may be because of poor wording of some of the questions of SSP. It has been hypothesized that some of the sensory items are worded such that the meaning may have been unclear to parents and it resulting in the different interpretation than intended, contributing to this diversify of responses.[7] Few examples are Q.7,Q.10,Q.18,Q. 36.

CONCLUSION

From this study it has been concluded that SSP can be used to evaluate sensory processing abilities of children with ASD. The behaviors of children with ASD are more widely distributed across the possible range of scores due to a broad spectrum of frequency of behavior occurrence. This variability in the magnitude of the symptoms is moderated by the age of the child. Therapists should not rely on the SSP only and should go for clinical observations, behavior during standardized assessment and structured play observations. SSP will be useful for screening sensory processing problems and assist in intervention planning that focused on enhancing child’s performance, social participation, and well being. SSP was made by the occupational therapists only so the views of caregivers of children with ASD and people with ASD with good intellectual abilities can be incorporated which increases the fruitfulness of SSP. This study recognizes the importance of assessing the performance of children from different cultural contexts, particularly in relation to their everyday functioning or occupation.

Limitation: The small sample is not indicative of all children in 3 to 10 age groups. All samples were taken from urban area of Ahmedabad that represents only one region of the country.

Limitation of SSP

- Some of the items in SSP are poorly worded so it becomes challenging to some caregivers.
- Sensory responses were considered only in the context of behavioral observations via caregiver’s reporting and not in direct observations.
- It does not include emotional and social responses.

Direction for Future Studies:

- The study can be done with large sample size
- Comparison studies can be done between
  - The different severity levels of Indian children with ASD
  - The children with and without ASD from different cultures and communities
• Performance of children with ASD from Urban and Rural area
• Children with other sensory processing disorders
• Children with and without other disabilities in Indian population on SSP
  - Study can be done to investigate the relevance of sensory processing aspects on the variable developmental presentation and occupational performance of children with ASD in Indian Population
  - Studies can be done to investigate Inter-rater Reliability and Validity studies of SSP in typical Indian children
  - Factor analysis of SSP based on Indian children with large Sample size
  - Modified SSP can be developed with the views of the caregivers of children with ASD and people with ASD with good intellectual abilities
  - Adaptation of SSP can be done-
    - Addition of the items in the sections of SSP so that all the items together represent each sensory system
    - Other sections can be added in SSP which focuses on emotional-social responses.

Conflict of Interest: Nil

Source of Funding: Self

Ethical Clearance: Ethical permission has been taken from the ethical committee and Institutes.

REFERENCES


Analyse the Reported Time Duration of SSP Filled up by the Caregivers of Children with and without ASD among Indian Population

Hetal Jagdishkumar Tripathi1, Titiksh Vijeshkumar Varma2, Krupa Babulal Prabhakar3, Ranjeet Pathak4, Amitabh Dwivedi5

1Occupational Therapist, Department of Occupational Therapy, Government Spine Institute, Civil Hospital Campus, Ahmedabad, Gujarat, India, 2Occupational Therapist, Department of Occupational Therapy, Civil Hospital, Asarwa, Ahmedabad, Gujarat, India, 3Physiotherapist Tutor, Trauma Center, Civil Hospital, Asarwa Ahmedabad, Gujarat, India, 4Assistant Professor / Incharge, Occupation Therapy College, IAHSET, Government Medical College, Haldwani, Nainital, Uttarakhanda, India, 5Principal, HOD and Professor of Jaipur Occupational Therapy College, Maharaj Vinayak Global University, Dhand, Amer, Jaipur, Rajasthan, India

ABSTRACT

The purpose of the study was to find out the difference between the reported time duration of SSP filled up by the caregivers of children with ASD and children without ASD among Indian population that can be useful to understand the psychology of the caregiver based on the time taken to fill up the form. Age and Gender matched 50 children with and without ASD were approached on different platforms and incorporated in the study on the basis of inclusion and exclusion criteria of the study. It has been come to the notice that the caregivers of children with ASD took less time as compare to the caregivers of children without ASD. From this study it has been concluded that the time duration invented by the researchers out of India for SSP cannot be implemented same as it is because India is having different cultural background. Therefore, whenever any tool is invented it needs to be modified according to the culture and language of that country. The sample does not represent the entire population of children with ASD and without ASD; therefore the study can be done with larger sample size. This study recognizes the importance of assessing the performance of children from different cultural contexts, particularly in relation to their everyday functioning or occupation.

Keywords: ASD- Autism Spectrum Disorder, SSP- Short Sensory Profile

INTRODUCTION

India’s culture refers collectively to the thousands of distinct and unique cultures of all regions and communities present in India. The eight schedule of the Indian constitution lists 22 languages which have been referred to as scheduled languages and given recognition, status and official encouragement. According to the census of India of 2001, India has 122 major languages and 1599 other languages. Different Cultural and languages play a major role in the lives of individuals.

ASD is characterized by persistent deficits in social communication and social interaction across multiple contexts, including deficits in social reciprocity, nonverbal communicative behaviors used for social interaction, and skills in developing, maintaining, and understanding relationships. In addition to the social communication deficits, the diagnosis of ASD requires the presence of restricted, repetitive patterns of behavior, interests, or activities. Symptoms typically are apparent before age 3 years. Because symptoms change with development and may be masked by compensatory mechanisms, the diagnostic criteria may be met based on historical information, although the current presentation must cause significant impairment.

ASD is a new DSM-V disorder encompassing the previous DSM-IV autistic disorder (autism), Asperger’s disorder, childhood disintegrative disorder, Rett’s disorder, and pervasive developmental disorder not otherwise specified. It was characterized by deficits in two core domains: 1) deficits in social communication and social interaction and 2) restricted repetitive patterns.
of behavior, interests, and activities.\textsuperscript{[4]}

In India, recent reviews of ASD epidemiological studies have reported higher estimates of incidence and prevalence than earlier studies and the current median ASD prevalence estimate is about 62 in 10,000 in India.\textsuperscript{[5]} There have as yet been no epidemiological studies of ASD conducted in India, or in any comparable region of the world in order to provide a definitive estimate of either prevalence or incidence. Most estimates are based on population, and there has been little evidence of variation based on geographic region (although this is an emerging field). Thus, while there are no studies from India, the numbers are likely to be similar. ASD is one of the most common developmental disabilities and current estimates of the prevalence of ASD are 1 in 250. This would suggest that there are approximately 4 million individuals with an ASD in India. Of course, the actual incidence is not known. Eighty per cent of those with ASD are males.\textsuperscript{[6]}

Need of the study:

To find out the difference between the mean time of reporting the SSP questionnaire by the caregivers between children with and without ASD among Indian population.

METHODOLOGY

\textbf{Study Design}: Quantitative observational study

\textbf{Target Population}: Children with ASD and Children without ASD

\textbf{Study Setting}: Ahmedabad

\textbf{Sample Size}: Children with ASD (50) and children without ASD (50) (Age and Gender matched)

\textbf{Codes of Ethics}:
- Permission was taken before filling up the form and written consent was taken in the form.
- Any personal information of the children and parents will not be disclosed.

\textbf{Inclusion criteria}:

For children with ASD group-
- Age within the specific range (3-10 years)
- Children diagnosed with ASD by pediatricians or child psychiatrists on DSM-V criteria

For children without ASD group-
- Age within the specific range (3-10 years)
- Absence of a diagnosed medical condition that might compromise the development of children (e.g: Mental Retardation, Learning Disabilities, Down syndrome, Cerebral palsy, ADHD)
- No children with Preterm birth (Preterm birth required gestation age of 34 weeks or less and birth weight under 2500 gms)\textsuperscript{[7]}
- No genetic history with ASD\textsuperscript{[8]}

\textbf{Exclusion criteria}:

For children with and without ASD:
- Uncooperative/ Unresponsive caregivers (Parents and family members)
- The children below the age of 3 years and above 10 years.
- The caregivers who does not understand the English language
- Caregivers (Parents and family members) who do not spend minimum 12 hours (except sleeping hours) a day with the child.

For children without ASD group-
- The children who are on medications for any condition
- The children who have any other disability

\textbf{Study period}: 8 Months

\textbf{Sampling method}: Quota Sampling

\textbf{Method Phase-1}

Ahmedabad is divided into 5 zones. 1) East zone 2) West zone 3) North zone 4) South zone 5) Central zone. The data of 10 children with ASD and 10 children without ASD were collected from each zone. In this way, the data of 50 children with ASD and 50 children without ASD were collected from whole Ahmedabad.

\textbf{Method Phase-2}

For children with ASD: 8 NGOs/Private Clinics/Hospitals/Trusts/Special Schools were approached for collecting the data. 86 children’s data were received but only 50 children (3 Years- 4 Boys + 2 Girls, 4 Years- 3 Boys + 2 Girls, 5-10 Years- 29 Boys + 10 Girls) were selected from them and rest 36 were eliminated due to different issues like 4 of them were not within the specific age range (3-10 years), 6 Children were not...
fitted in the guidelines of DSM-V, caregivers of 14 children were uncooperative/unresponsive or they did not show interest in responding properly, 6 children were having other disabilities (3 children with Mental retardation, 2 children with learning disabilities and 1 child with preterm birth), 3 children were taking drugs for epileptic condition, 3 caregivers of children do not understand English language.

For children without ASD: The aim was clear to collect the age and gender matched data of normal children. 5 Normal schools of 5 regions were approached for data collection purpose and 85 data of children were received. From those 85 children, 35 children were excluded as they were meeting the exclusion criteria (7 children were on medication, 15 children were out of age specific range, 3 caregivers of children do not understand English language and 10 children had uncooperative/unresponsive or they did not show interest in responding properly) and only the data of 50 children were collected.

Purpose of the study was explained to the caregivers and written informed consent was taken. Detailed information of the children was taken from the caregivers. SSP and 5 point Likert Scale were explained to the caregivers well in advance before filling up the SSP. The caregivers marked each question and filled up the form. The time for filling up the questionnaire was reported in the sheet for both the groups (Children with and without ASD).

**FINDINGS & DISCUSSION**

**Table-1 Data Distribution**

<table>
<thead>
<tr>
<th>Gender</th>
<th>3 Years</th>
<th>4 Years</th>
<th>5-10 Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boys</td>
<td>4 (8%)</td>
<td>3 (6%)</td>
<td>29 (58%)</td>
</tr>
<tr>
<td>Girls</td>
<td>2 (4%)</td>
<td>2 (4%)</td>
<td>10 (20%)</td>
</tr>
<tr>
<td>Total</td>
<td>6 (12%)</td>
<td>5 (10%)</td>
<td>39 (78%)</td>
</tr>
</tbody>
</table>

During the procedure of collecting the data of children with ASD, the researcher could not get enough girls to match with the number of boys. It has been noticed that the number of boys are four times more in compared to the girls.\(^3\)

**Table-2 Reported time duration of SSP filled up by the caregivers of children with ASD**

<table>
<thead>
<tr>
<th>Children with ASD</th>
<th>Duration (in Minutes)</th>
<th>Sr. No.</th>
<th>Duration (in Minutes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>20.03</td>
<td>26.</td>
<td>20.47</td>
</tr>
<tr>
<td>2.</td>
<td>18.57</td>
<td>27.</td>
<td>21.22</td>
</tr>
<tr>
<td>3.</td>
<td>19.22</td>
<td>28.</td>
<td>21.34</td>
</tr>
<tr>
<td>4.</td>
<td>15.07</td>
<td>29.</td>
<td>20.03</td>
</tr>
<tr>
<td>5.</td>
<td>19.55</td>
<td>30.</td>
<td>23.44</td>
</tr>
<tr>
<td>6.</td>
<td>16.34</td>
<td>31.</td>
<td>23.17</td>
</tr>
<tr>
<td>7.</td>
<td>19.58</td>
<td>32.</td>
<td>21.23</td>
</tr>
<tr>
<td>8.</td>
<td>20.05</td>
<td>33.</td>
<td>24.45</td>
</tr>
<tr>
<td>9.</td>
<td>17.21</td>
<td>34.</td>
<td>19.56</td>
</tr>
<tr>
<td>10.</td>
<td>17.03</td>
<td>35.</td>
<td>19.34</td>
</tr>
<tr>
<td>11.</td>
<td>19.03</td>
<td>36.</td>
<td>20.06</td>
</tr>
<tr>
<td>12.</td>
<td>21.33</td>
<td>37.</td>
<td>19.23</td>
</tr>
<tr>
<td>13.</td>
<td>19.05</td>
<td>38.</td>
<td>19.34</td>
</tr>
<tr>
<td>14.</td>
<td>18.02</td>
<td>39.</td>
<td>19.45</td>
</tr>
<tr>
<td>15.</td>
<td>17.02</td>
<td>40.</td>
<td>18.40</td>
</tr>
<tr>
<td>16.</td>
<td>18.06</td>
<td>41.</td>
<td>17.30</td>
</tr>
<tr>
<td>17.</td>
<td>20.44</td>
<td>42.</td>
<td>21.45</td>
</tr>
<tr>
<td>18.</td>
<td>18.29</td>
<td>43.</td>
<td>20.43</td>
</tr>
<tr>
<td>19.</td>
<td>19.45</td>
<td>44.</td>
<td>21.40</td>
</tr>
<tr>
<td>20.</td>
<td>18.03</td>
<td>45.</td>
<td>20.01</td>
</tr>
<tr>
<td>21.</td>
<td>21.39</td>
<td>46.</td>
<td>24.22</td>
</tr>
<tr>
<td>22.</td>
<td>20.40</td>
<td>47.</td>
<td>22.26</td>
</tr>
<tr>
<td>23.</td>
<td>17.09</td>
<td>48.</td>
<td>21.56</td>
</tr>
<tr>
<td>24.</td>
<td>23.08</td>
<td>49.</td>
<td>22.09</td>
</tr>
<tr>
<td>25.</td>
<td>20.03</td>
<td>50.</td>
<td>23.23</td>
</tr>
</tbody>
</table>

Mean time for filling up the SSP is 20.36 minutes for children with ASD by their caregivers.
Table-3 Reported time duration of SSP filled up by the caregivers of children without AsD

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Duration (in Minutes)</th>
<th>Sr. No.</th>
<th>Duration (in Minutes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>25.05</td>
<td>26.</td>
<td>20.43</td>
</tr>
<tr>
<td>2.</td>
<td>26.21</td>
<td>27.</td>
<td>21.40</td>
</tr>
<tr>
<td>3.</td>
<td>23.03</td>
<td>28.</td>
<td>20.01</td>
</tr>
<tr>
<td>4.</td>
<td>22.03</td>
<td>29.</td>
<td>24.22</td>
</tr>
<tr>
<td>5.</td>
<td>25.33</td>
<td>30.</td>
<td>23.44</td>
</tr>
<tr>
<td>6.</td>
<td>21.05</td>
<td>31.</td>
<td>23.17</td>
</tr>
<tr>
<td>7.</td>
<td>28.02</td>
<td>32.</td>
<td>21.23</td>
</tr>
<tr>
<td>8.</td>
<td>29.02</td>
<td>33.</td>
<td>24.45</td>
</tr>
<tr>
<td>9.</td>
<td>30.23</td>
<td>34.</td>
<td>19.56</td>
</tr>
<tr>
<td>10.</td>
<td>26.34</td>
<td>35.</td>
<td>19.34</td>
</tr>
<tr>
<td>11.</td>
<td>21.45</td>
<td>36.</td>
<td>20.06</td>
</tr>
<tr>
<td>12.</td>
<td>28.40</td>
<td>37.</td>
<td>20.47</td>
</tr>
<tr>
<td>13.</td>
<td>27.30</td>
<td>38.</td>
<td>21.22</td>
</tr>
<tr>
<td>14.</td>
<td>29.36</td>
<td>39.</td>
<td>21.34</td>
</tr>
<tr>
<td>15.</td>
<td>28.26</td>
<td>40.</td>
<td>20.03</td>
</tr>
<tr>
<td>16.</td>
<td>27.39</td>
<td>41.</td>
<td>22.26</td>
</tr>
<tr>
<td>17.</td>
<td>26.22</td>
<td>42.</td>
<td>21.45</td>
</tr>
<tr>
<td>18.</td>
<td>25.27</td>
<td>43.</td>
<td>28.40</td>
</tr>
<tr>
<td>19.</td>
<td>28.22</td>
<td>44.</td>
<td>27.30</td>
</tr>
<tr>
<td>20.</td>
<td>29.56</td>
<td>45.</td>
<td>29.36</td>
</tr>
<tr>
<td>21.</td>
<td>24.52</td>
<td>46.</td>
<td>28.26</td>
</tr>
<tr>
<td>22.</td>
<td>27.51</td>
<td>47.</td>
<td>27.39</td>
</tr>
<tr>
<td>23.</td>
<td>26.41</td>
<td>48.</td>
<td>21.23</td>
</tr>
<tr>
<td>24.</td>
<td>25.43</td>
<td>49.</td>
<td>24.45</td>
</tr>
<tr>
<td>25.</td>
<td>27.11</td>
<td>50.</td>
<td>23.44</td>
</tr>
</tbody>
</table>

Mean time for filling up the SSP is 25.05 minutes for children without AsD by their caregivers.

Graph-1 Mean of reported time duration of SSP filled up by the caregivers of children with and without AsD

Mean time for filling up the SSP is 20.36 minutes for children with AsD and 25.05 minutes for children without AsD.

CONCLUSION

It has been observed by the researcher while collecting the data, the caregivers got confused with few of the questions of the SSP and they asked for the help of the researcher to make them understand so that they could report properly. The ideal time to report the questions of the SSP is 10 Minutes (invented by Dunn)[9] but it was observed by the researcher that the caregivers of children with AsD took mean time of 20.36 minutes to fill it up the form whereas it is 25.05 minutes for children without AsD. It has been come to the notice that the caregivers of children with AsD took less time as compare to the caregivers of children without AsD. It can be assumed that the caregivers of children with AsD are more aware and pretty sure about the abnormal behaviours of their children whereas the caregivers of children without AsD took more time to recollect their experiences regarding their children’s behaviours as they have not observed the obvious altered behaviours as mentioned in the SSP.

Along with that the English language of SSP also create barriers for the rest of the children who go to the schools and centers every day, though their data has not been collected as their caregivers do not understand English language therefore the SSP can be translated in Indian regional languages and it will be very fruitful for further studies with SSP. This study recognizes the importance of assessing the performance of children from different cultural contexts, particularly in relation to their everyday functioning or occupation.

From this study it has been concluded that the time duration invented by the researchers out of India for SSP
can not be implemented same as it is because India is having different cultural values. Therefore whenever any tool is invented it needs to modified according to the culture and language of that country to increase its effectiveness.

Limitations of the study

The sample does not represent the entire population of children with and without ASD, the small sample is not indicative of all children in 3 to 10 year age- groups. All samples were taken from urban area of Ahmedabad that represents only one region of the country.

Direction for Future Studies

• The study can be done with large sample size
• Cultural adaptation and translation of SSP for typical children of Indian population
• Certain items on SSP need to be reworded which helps Indian parents to understand questions easily

Conflict of Interest: Nil

Source of Funding: Self

Ethical Clearance: Ethical permission has been taken from the ethical committee and Institutes.

REFERENCES

Common Repetitive Stress Injury among Housewives, Karachi Pakistan

Sadaf Subhi1, Iram Iqbal Shamsi2, Umesh Kumar3, Reeta2
1Physiotherapist HOD (Physiotherapy) Holy Family Hospital Afridi (S.J) Shaheed Road Karachi, 2Senior. Lecturer (Physiotherapy), 3Senior Physiotherapist, Institute of Physical Medicine & Rehabilitation (IPMR) Dow University of Health Sciences Karachi (DUHS)

ABSTRACT

Background: A frequently cited problem in epidemiological research is the inadequate operational definition of umbrella terms such as Repetitive stress injury (RSI). Specific conditions attached to these labels and their corresponding signs and symptoms are also poorly defined. The clinicians usually do not include the RSI in their list of differential diagnosis. There has been far too little attention paid to the dangers of Repetitive Stress Injuries (RSIs) among housewives.

Objectives: The aims and objectives of this was to identify the most common repetitive stress injury among housewives appropriate to work-related conditions.

Study Design: Cross-sectional study.

Setting: OPD of Jamal Noor Hospital, Holy Family Hospital, MS Hospital Karachi, Pakistani.

Methods and Materials: The sample of 100 housewives were collected through quota sampling technique.

Results: The study shows that Out of 100 housewives, 47 % of them complain of lateral side elbow pain (Lateral Epicondylitis) who are working more than one hour. The most aggravating activities found are the cloth washing and pin rolling activities.

Conclusion: This study was done to observe the most common repetitive stress injury among housewives of Karachi. Literature and study reported that most common RSI was tennis elbow and most precipitating factor was cloth washing. We need to disseminate the study and is finding so to impart knowledge with proper awareness, education and modification in activities certainly can control and reduce the economic burden and at the same time improve work productivity as well.

Keywords: musculoskeletal disorders, repetitive stress injuries, tennis elbow, lateral epicondylitis.

INTRODUCTION

The work environment of today is synonymous with stress, fatigue and exhaustion. As a result, the incidence of workplace injury and disease is increasingly commonplace. Repetitive strain injury (RSI) is the most common form of work-related ill-health. RSI also has significant implications for organizations in terms of lost productivity, drops in work quality and costly compensation claims.1 General terms applied to RSI include repetitive stress injury, repetitive motion injuries, repetitive motion disorder (RMD), cumulative trauma disorder (CTD), occupational overuse syndrome, overuse syndrome and regional musculoskeletal disorder.2

At present an increasingly common challenge to clinicians. They consist of a variety of musculoskeletal disorders, generally related to tendons, muscles, or joints,
as well as some common peripheral-nerve-entrapment and vascular syndromes. These disorders generally affect the back, neck, and upper limbs, although lower limbs may also be involved. Although RSI may occur due to sports and recreational activities, occupational RSI, affecting the patient’s live. These injuries result from repetitive and forceful motions, awkward postures, and other work-related conditions and ergonomic hazards.

In simple medical terms, repetitive stress injury (RSI) is defined as a cumulative trauma disorder (CTD) arising from prolonged repetitive, forceful, or awkward hand movements. The results are eye strain, damage to muscles, tendons, and nerves of the neck, shoulder, forearm, and hand, which can cause pain, weakness, and numbness.

They constrain the range of postures that are possible while performing the task and, in poorly designed workplaces, are often found to make a healthy posture difficult or impossible. Musculoskeletal injuries and disorders produced by various human activities cause an increasing number of human and economic losses.

Cumulative trauma disorders account for 56% of all occupational injuries. Currently, occupational injuries affect 15% to 20% of all Americans. The United States government predicts that by the year 2000, 50% of the American workforce will have occupational injuries annually and 50 cents of every dollar will be spent on cumulative trauma disorders.

The prevalence of upper-body work-related RSI was 5.9% in the Canadian population in 2003. An active lifestyle during leisure time was associated with a lower prevalence of work-related upper-body RSI.

Northeast Brazil was found prevalence rates of 56% for symptoms of the upper limbs and 30% for ‘RSI-like condition’. The estimated prevalence of clinically confirmed cases of RSI was 22%.

Whereas, In the Netherlands, each year, 8% of working Dutch citizens takes time off work due to RSI symptoms. This figure has risen consecutively over the last three years. High perceived job stress and a high workload are thought to be related to RSI, and women report more symptoms than men. Ratzlaff CR et al, 2007; the prevalence of upper-body work-related RSI was 5.9% in the Canadian population in 2003. An active lifestyle during leisure time was associated with a lower prevalence of work-related upper-body RSI.

**METHODOLOGY**

A cross sectional study was conducted was conducted in the physiotherapy departments of OPD of Jamal Noor hospital, Holy Family Hospital, MS Hospital Karachi Pakistani. The duration of the study was 2 months after the approval of synopsis. with the sample population of 100 housewives in total. The sample selected was entirely on the inclusion and exclusion criteria defined. All the patients that were included in the study were Housewives with age group of 25 to 55 with non-traumatic pain. Housewives with traumatic cases history, women not involve in any other professions, age group not above 55 or below 25 and participants who are not willing to participate were excluded respectively.

**Statistical method and data analysis:**

This study was focused on the commonest injury among housewives because of disturbance in domestic life and economically burden in house budget. Our research was conducted on a sample size of 100 housewives were selected through quota sampling. So, the data was entered and analyzed on SPSS version 22. The Percentage values were assessed through self-administered questionnaire which was modified. Questionnaire with consent form was distributed among participants. Data was analyzed by descriptive statistics frequency with quota sampling.

**RESULTS**

Data was collected from 100 Participants (Housewives) who were not involved in other professions. 47 subjects of them complain of lateral side elbow pain (Lateral Epicondylitis), 20 subjects complain of Shoulder Pain (Supra Spinatus Tendentious), 15 subjects complain of Thumb Pain (De quervain tendinitis), 10 subjects complain of Upper back pain, 03 subjects complain of Wrist pain (CTS), 02 subjects complain of Knee pain (House Maid Knee), 02 subjects complain of lower back Pain, table 1. respectively. Lateral elbow pain was found to be the commonest complain of housewives involved only in domestic house hold activities.
26 housewives’ subjects who worked for 1 hour had complained of pain and inability to continue activities, 13 housewives with 2 hours, 08 housewives subjects with 3 hours, respectively. One-hour group aggravating activity was cloth washing 42%, pin rolling was 23% of them. In two hours group, most aggravating triggering activity was cloth washing 57% followed by cutting 21%, in three-hour group most aggravating activity was rolling pin 50% followed by cutting 25%, respectively (table 2). For all groups common, relieving factor was REST.

**TABLE 2: PAINFUL ACTIVITIES**
DISCUSSION

The purpose of this study was to explore the commonest occurring repetitive stress injuries among housewives of Karachi.

The world’s populations over the age of 10 spend one third of their time at work. Repeated motions performed during normal work or daily activities cause muscular disorders conditions. The mechanical degradation of the tissue due to overuse cause serious injuries. These repetitive movements performed over a longer period not only affect the office workers but also the housewives who work continuously without any break.

The results of this study show most commonly occurred repetitive stress injury was Tennis elbow among housewives which consist of 47%. 55% subjects had complained of pain in first hour of activity and main troublesome activity was cloth washing followed by two hours group which also had same aggravating activity of cloth washing. On the contrary three hours group was found to involve in rolling pin activity was 50%. David McBride et al, 2015; concluded that there are also many important psychosocial confounders in the personal and work domains, it can therefore be difficult to demonstrate a causal relationship when studying MSDs, for example the temporal relationship is often uncertain. Although the work-relatedness of some MSDs has been questioned, it is nevertheless of vital importance to understand the role of the work place in both causation and rehabilitation.10

Furthermore, Cheung TW et al, 2016; suggested in there study that Decision-making in housework among these women involved three main themes: (i) emotional attachment to housework; (ii) cognitively informed decision; and (iii) emotionally influenced decision. Women with upper limb RSI had to make cognitive decisions for or against a change in housework to manage their condition. 11

However, Gillian S et al, 2010; found that RSI is prevalent amongst the South African population. 47% indicated experiencing neck, shoulder and back discomfort, followed by 42% reporting eyestrain, and 24% muscle stiffness. In general, the more physically demanding or strenuous occupations were known to be the primary source of RSI, as seen in tasks that require repetition, excessive force or awkward postures. 12

Sharwan Kumar; 2001 recommended in their study that all occupational musculoskeletal injuries are biomechanical in nature. Theory accounts for unbalanced and asymmetric occupational activities create differential fatigue and thereby a kinetic and kinematic imbalance resulting in injury precipitation.13

Nevertheless, in this study the most relieving factor for all groups was found to be rest, they approach a holistic way of treating their pain and inability to continue their activities. Whereas, Gareth T Jones et al, 2014; found that there is a worthwhile benefit from remaining active and maintaining usual activities while awaiting physiotherapy treatment. If this is the case, this would provide strong evidence that the advice currently given to patients with distal arm pain should be changed. They should be advised to rest the arm or remain active within the limits imposed by their symptoms. 14

CONCLUSION

This study was done to observe the most common Repetitive Stress Injury among housewives of Karachi. Literature and study reported that most common RSI was Tennis elbow and most precipitating factor was cloth washing. There is still a room for research on this topic with being more specific and targeted with more sample size. However, the study was totally depended on the housewives feedback, the statics they provide were their own perception.

We need to disseminate the study and is finding so to impart knowledge with proper awareness, education and modification in activities certainly can control and reduce the economic burden and at the same time improve work productivity as well.

Ethical Clearance: Informed consent & questionnaire has been taken from every patient.

Source of Funding: Self

Conflict of Interest: Nil

REFERENCES


Effectiveness of Cumin (Nigella Sativa) Extract on the Decrease of IL-6 Serum Level and P65 Placental NF-kB Expression in Preeclampsia Mice

Hamimatus Zainiyah¹, Rubiati Hipni², Ni Wayan Novian³, I Wayan Agung Indrawan⁴

¹Health Sciences Institute Ngudia Husada, Bangkalan, Madura, Indonesia, ²Health Polytechnic Ministry of Health, Banjarmasin, South Kalimantan, Indonesia, ³Obstetrics Academy, Denpasar, Bali, Indonesia, ⁴Social Obstetrics and Gynecology Division, Department of Gynecology Obstetrics, Saiful Anwar Hospital, Brawijaya Medical Faculty, Malang, East Java, Indonesia

ABSTRACT

Analyzing the Effectiveness of Black Cumin (Nigella Sativa) extract on serum IL-6 levels and placenta NF-kB p65 expression in rats preeclampsia. The IL-6 method uses ELISA and NF-kB using immunohistochemistry. Results: IL-6 and NF-kB show a decreased level after being treated with a dose of 1500 mg / BB. Conclusion: Black cumin extract has the effect to reduce serum IL-6 levels and expression of p65 NF-kB placenta which will be used as a therapy for preeclampsia disorders.

Keywords: Interleukin 6 (IL-6), Nuclear-ƙB Factor (NF-ƙB ), Black cumin extract, Preeclampsia

INTRODUCTION

Preeclampsia is a medical complication of pregnancy and occurs in around 5% - 8% of pregnancies causing high morbidity and maternal mortality and fetus1,2. Pregnancy hypertension is the second cause of 27.1% of AKI in Indonesia. The case of preeclampsia in East Java ranked first as much (34.88%) as the cause of maternal death and preeclampsia/eclampsia in 2013 was 71.4% 3.4.

Preeclampsia is a disorder of a specific pregnancy characterized by hypertension and proteinuria at a gestational age after 20 weeks causing high maternal and fetal morbidity, IUGR, and preterm birth. The placenta is one of the causes of maternal endothelial dysfunction that can cause hypertension, urine protein, endothelins, HEELP syndrome) hemolysis, elevated liver, enzymes, and low platelets) and cerebral brain inflammation which is a clinical sign of preeclampsia and eclampsia1,2,5. The causes of preeclampsia include uteroplacental hypoxia, imbalance of angiogenic and antiangiogenic proteins, oxidative stress, maternal endothelial dysfunction, cytotoxic and systemic and systemic inflammation.6

Endothelial dysfunction causes an imbalance of substances from vasodilator with vasodilators causes hypertension and hypoxia7,8,9. Hypoxia triggers leukocyte activity causing inflammation and increased proinflammatory cytokines such as (IL-6) activated via the nuclear factor-kB pathway (NF-kB)10,11,12. Proinflammatory cytokines such as IL-6 have a relationship between placental ischemia, cardiovascular and endothelial dysfunction so that cytokines in preeclampsia have plasma IL-6 levels even an increase of two to three times.

Black cumin (Nigella sativa) is useful as an anti-oxidant, anti-inflammatory, anti-hypertensive. Nigella sativa in traditional Indian medicine systems such as Unanu and Ayuverda. Among Muslims, Nigella sativa is considered the best medicine, because the guidance of the prophet Nigella sativa is a cure for all diseases except death13,14,15. Nigella sativa extract containing thymoquinone reduces proinflammatory cytokines in endothelial dysfunction. Thymoquinone (TQ inhibits inflammatory cytokines such as TNFa, interleukin-1 and interleukin 6 and transcription factors, nuclear factor kB (NF-kB). Thymoquinone as an inflammatory inhibitor works through anti-inflammatory and proapoptotic. actions 14,16Black cumin (Nigella sativa ) as unknown anti-inflammatory treatment of preeclampsia. From the above data, the researchers were interested in conducting a study of the positive effects of black cumin (Nigella sativa) on IL-6 and p65 placenta NF-kB expression in mice
MATERIAL AND METHOD

This study used pregnant mice injected with serum of severe preeclampsia mothers and serum of normal pregnant women, human serum injected in pregnant mice got the symptoms of preeclampsia in mice. Healthy mice as rats approach the preeclampsia model. injected with severe preeclampsia maternal serum and divided into 6 groups. this study described extracts of black cumin given group 1: dose of 500 mg / KgBW / day, group 2: dose of 1000 mg / KgBB / day, group 3: dose 1500 mg / KgBB / day and group 4: dose 2000 mg / Kg/day, increasing the group dose given the series if the difference of 500 mg is calculated from the previous dose. Duration black cumin extract administered orally from 15th to 20th day of gestation. The process of making black cumin extract through 3 stages: drying process, extraction process in the form of thick oil (dark oil) and dark chocolate close to 100cc, the active extract concentration is 100%) and the evaporation process.

IL-6 measurements were filled with the ELISA method using the mouse interleukin 6) IL-6) ELISA kit made by Biolegend Bioassay Technological Laboratory number catalog 431301. Measurement of NF-kB on the placenta ie Immunohistochemistry was used to measure the level of NF-kB in the placenta. The measurement procedure is carried out based on the previous method with a slight modification.

FINDINGS

Measurement of IL-6 measurements using the ELISA method

Serum IL-6 levels in six simple groups are presented in full shown in the histogram (stem diagram of the image below. Average showed this study dose of ethanol extract from Nigella sativa sedes most rapidly reduced serum IL-6 levels in 1500 mg preeclampsia mice. so, in other words, the optimal dose of 1500mg of ethanol extract of Nigella sativa seeds significantly lowered serum levels, IL-6 levels in rats with preeclampsia.

The expression of the p65 NF-kB subunit was expressed by counting the number of trophoblastic cells of the DA chromagen cytoplasm (Brown). The negative control group obtained several positive cells and color reactions, whereas in the positive control of brown color appeared in placental tissue, this showed that the expression of p65 NF-kB was sufficient in positive control placental tissue (K +) whereas in the treatment group (P) showed expression NF-kB p65 in the weakest P4 treatment group compared to other groups

Results of NF-kB level measurements.

The effect of black cumin extract is based on the dose depending on the method. High doses produce a high decrease in NF-kB levels. C = Control; P1 = rat preeclampsia; P2 = preeclampsia mice with black cumin extract 500mg / kg BB; P3 = preeclampsia mice with black cumin extract 1000mg / kg BB; P4 = preeclampsia rats with 1500mg / kg BB black cumin extract; P5 = preeclampsia mice with 2000mg / kg BB black cumin extract. Significance of P<0.05.

DISCUSSION

Based on the results of a one-way ANOVA test at serum ILL-6 level, there was a significant difference in the mean serum IL-6 levels from the five sample groups observed, this was indicated by the p-value = 0,000, 0,05. The results of several comparative tests with LSD test showed that there was a difference between significant in serum IL-6 levels on the average between the positive control group (mouse model of preeclampsia) (49.38 ± 3.38a pg / mL) with the treatment group giving 500 of Nigella ethanol extract of sativa seeds (37.43 ± 1.67 pg / mL), with a dose of 100 mg (7.83 ± 0.93 pg / mL) at a dose of 1500 mg (5.54 ± 1.01c pg / mL) and also with dose of 2000mg (35.91 ± 0.83 bpg / mL). this means that there is a treatment effect of giving ethanol extract of Nigella sativa seeds at 500 mg, 1000 mg, 1500 mg, and 2000 mg to serum IL-6 levels in preeclampsia rats the effect of ethanol extract on Nigella sativa seeds reduces serum IL-6 levels. There was a decrease in serum IL-6 levels along with an increase in the ethanol extract dose of Nigella sativa seeds given to preeclampsia rats, except that the dose of 2000 mg increased again. So the hypothesis has been proven, namely the administration of ethanol extract of Nigella sativa seeds reduces serum levels of IL-6 mice injected with maternal severe serum preeclampsia.

Based on the results of the study presented, the treatment of ethanol extract of various doses of Nigella sativa seeds had a significant effect on serum IL-6 levels in the mouse model of preeclampsia. Likewise, the dose of ethanol extract obtained from Nigella sativa seeds was the most optimal decrease in serum IL-6 levels of 1500 mg. Preeclampsia is a characteristic if
endothelial dysfunction. Leptin IL-6, IL-8, IL-10, and TF-a are proinflammatory cytokines and markers of endothelial dysfunction, other studies have shown that in preeclampsia there is widespread damage such as endothelial dysfunction, placental oxidative pressure, and imbalance in the immune system ration (T helper 1 / T helper 2). An overactive immune system causes an increase in abnormal proinflammatory cytokines or a decrease in anti-inflammatory cytokines in pregnancy19,20,21,22

Based on research it is known that Nigella sativa and Thymoquinone (TQ) show the ability to inhibit inflammatory cytokines such as TNFa, interleukin-1 and interleukin and transcription factors, nuclear factor B (NF-b)13,23,24,25. Inflammation is mediated by two enzymes, cyclooxygenase, and lipoxygenase, producing prostaglandins and leukotrienes which are the main mediators of inflammation. Thymoquinone is believed to provide anti-inflammatory effects inhibiting the synthesis of prostaglandins and leukotriene 16,17,18,26. The results of the study of Nigella sativa as an anti-inflammatory. Nigella sativa containing Thymoquinone inhibits activation of IKK so that sub-nit NF-kB p65 as transcription is not activated, thymoquinone inhibits binding of NF-B to DNA in the nucleus. In the results of the ethanol extract of Nigella sativa seed dose 2000 mg / kgBW / day there was an increase in IL-6 levels due to hormesis effect, at low doses giving a beneficial effect and high doses t gave side effects or toxic effects27,28

Based on the results of my analysis there was a significant effect of cumulative ethanol extract from cumin sedes on decreased expression of NF-kB p65 with p-value of 0,000 (p, 0.05), in the positive control (mouse model of preeclampsia) there was the highest NF-kB expression, whereas in the group the treatment is given various doses of cumin seed ethanol extract there was a decrease in NF-kB expression and the most optically decreased dose decreased NF-kB expression was dose 4 (2000mg / Kg/day) using cumin extract ethanol reduced NF-kB expression.

The results of this study are in accordance with the research Nigella sativa which contains thymoquinone, inhibit the signaling pathway of NF-kB and inhibiting transcripti TQ are inhibitors of inflammatory pathways which is amalgams as anti-inflammatory and antiapoptosis29. Treatment of Eith TQ after 4 hours of almost maximal administration inhibited the activation of NF-kB p65 even after 6 hours of not performing NF-kB. TQ Works against NF-KB activation correlates by inhibiting activation of IkB kinase IkB phosphorylation, IkBa degradation, p65 phosphorylation, p65 nuclear translocation and gene expression.28

Cumin (Nigella sativa) or black seeds have anti-inflammatory and analgesic effects. Based on the study it was found that N. sativa and Thymoquinone (TQ) showed the ability to inhibit inflammatory cytokines such as TNFa, interleukin-1 and interleukin 6 and NF-kB transcription factors orally with methanol extract of Nigella sativa at a dose of 2000 mg / KgBB for 14 days in mice did not cause toxic effects and death14,25,29

The results of this study indicate that the administration of Nigella sativa is able to reduce placental NF-kB p65 I expression of mycoplasma in the preeclampsia model. TQ has been shown to regulate cell proliferation and inflammation, and mediate effects through the regulation of the NF-kB pathway. TQ as an anti-inflammatory regulates release if TNFa binds to the TNFa receptor thereby reducing the induction of IkB kinase activation phosphorylating p65 NF-kB in the cytoplasm. TQ suppresses activation of the NF-kB pathway through modulation of the NF-kB p65 subunit and inhibits IKK, regulates gene products including involvement in cell survival, proliferation and invasion and strengthens TNFa-induced apoptosis. TQ has a double-inhibitory effect, first through the NF-kB inhibitory signal pathway and second transcription.

CONCLUSION

Black cumin extract has the effect to reduce serum IL-6 levels and expression of p65 NF-kB placenta which will be used as a therapy for preeclampsia disorders

Conflict of Interest: The Author (s) declare that they have no conflict of interest

Source of Funding: Self-sourced

Ethical Clearance: This study was approved by the institutional review board of Brawijaya University. The research received a certificate No 567/EC/KEPK/11/2015.

REFERENCES

1. Shah DA, Khalil RA. Bioactive factors in the uteroplacental and systemic circulation


18. Wicaksono BA, Candra S, Baktiyani W, Fitri LE. Intrapertoneal injection of high tumor necrosis factor (TNF-α) increases serum — such as tyrosine kinase 1 soluble (sFLT-1) and blood pressure of pregnant mice. 2015;5(1):1-4


20. Ida, B., Corebima, R. V, Subandiyah, K., & Fitri, LE Expression and Activation of NF-xB p65 in Mononuclear Cells in Nephrotic Steroid Resistance Syndrome in Patients with Childhood Expression and Sub Unit Activation p 65 NF-xB in Mononuclear Cells in Children with Steroid-

22. Xiao, JP, Yin, YX, Gao, YF, Lau, S, Shen, F, and Zhao, M et al., Increased maternal serum levels of IL-6 are associated with the severity and onset of preeclampsia. Cytokines. 2012;60(3):856–860.


To Study the Effectiveness of Occupational Therapy in Children with Overweight/Obesity and its Impact Upon Quality of Life

Ritika Gogia¹, Rashida Begum²
¹Paediatrics, ²Assistant Professor, Dept. of Rehabilitation Sciences, Jamia Hamdard, New Delhi

ABSTRACT

Background: To study the effectiveness of occupational therapy program in obese/overweight children and to study impact of obesity on psychosocial issues of adolescents.

Objective: To Study the Effectiveness of Occupational Therapy in Children with Overweight/Obesity and its Impact upon Quality of Life.

Materials and Method: A pre-test post-test experimental group design was used. The study was conducted with 30 obese/overweight children who had their BMI more than 25kg/m². Permission was taken from a private school located in New Delhi. 30 children were selected based on the inclusion criteria written consent from children and their parents were taken. Self-esteem and Quality of life of mothers of children with overweight/obesity was assessed using Rosenberg self-esteem scale and PEDS-QL Inventory. Occupational therapy interventions was given to children and followed by a post assessment.

Results: The findings of the study reveal that occupational therapy intervention improves self-esteem and quality of life in children with overweight/obesity. Occupational therapy intervention gives a positive impact on mental health as well as on physical health of children with overweight/obesity. The mean scores of all domains of quality of life pre and post were significantly improved. Self-esteem was also improved from mean of 14.9 to 26, t value of 39.501, which too improved significantly.

Conclusion: It is concluded that occupational therapy addresses the prevention and concerns of obesity through a holistic and client centered approach to lifestyle through participation in activities that promotes health and quality of life.

Keywords: Obesity, overweight, quality of life, self-esteem

INTRODUCTION

Childhood obesity, one of the most current issues of health education today, poses short and long-term effects on health and wellness. Studies show that more than one-third of children aged 6 to 19 years are considered at risk for overweight or are overweight¹. The global prevalence of childhood obesity is also increasing very rapidly², the current prevalence of obesity among children and adolescents is 29% in private school and 11.3% in government school³.

Obesity and overweight affect children’s morbidity and mortality, overall health, academic achievement, and quality of life⁴. From an occupational perspective, meaningful engagement and active participation in childhood occupations in any context are significantly diminished by being overweight or obese, in turn undermining a child’s physical, social, emotional, and mental health⁵. Obesity significantly impacts physical, social, emotional, and school domains⁶. These struggles
experienced as children may lead to decreased self-esteem, self-worth, and confidence. 

Occupational Therapy has a vital role in promoting health, well-being, and quality of life for children and youth who are overweight or obese and their families.

According to American occupational therapy association’s (AOTA’s) statement on obesity, occupational therapy’s holistic and unique focus on occupation and daily life activities offers structured intervention and support for the management of obesity across lifespan regardless of ability. Occupational therapy services are often used directly and indirectly to influence weight management and related health concerns through attention to lifestyle and engagement in fulfilling activities.

Occupational Therapy interventions are effective in fostering use of virtual reality technology to increase physical activity for patients living in a mental health residential facility, engaging adolescents in increased physical activity, adapting physical activity for children who are obese, and educating children about optimal nutritional choices.

EXPERIMENTAL HYPOTHESIS

Occupational therapy intervention improves quality of life of children with overweight/obesity.

NULL HYPOTHESIS

Occupational therapy intervention has no effect on quality of life of children with overweight/obesity.

METHODOLOGY

TYPE OF STUDY: Pre and post experimental study design

SAMPLE SIZE: A minimum of 30 subjects will be selected for the study based on inclusion & exclusion criteria

PLACE FOR DATA COLLECTION: Bharatiya Vidya Bhavan, K.G Marg New Delhi 110001

SAMPLING DESIGN: Convenient Sampling

VARIABLES

- Independent variables: Occupational Therapy intervention
- Dependent variables: Obesity, self-esteem

INCLUSION CRITERIA

- Adolescents with obesity/overweight.
- Children with BMI more than 25kg/m2

EXCLUSION CRITERIA

- Child having cardiovascular, neurological or musculoskeletal problems.
- Child having weight gain due to side effects of some ongoing medication/s.
- No metabolic or other systemic disease.

OUTCOME MEASURES

1. Weight
2. B.M.I (BODY MASS INDEX)
3. PEADS Quality of life inventory
4. Rosenberg self-esteem scale

PROCEDURE

30 overweight/obese children participated in the study. Participation was voluntary and data collected was confidential. Individuals were explained about the program, the risks and benefits involved in the program. Consent form was duly signed by the parents of children. Permission was taken from private school in New Delhi. General assessment of children was carried out.

Each individual was then evaluated for B.M.I and Weight. Each individual responded to PEADS QL and ROSENBERG SELF ESTEEM SCALE. Each subject was provided 45 min of 5 days a week of occupational therapy intervention and an Occupational Therapy based Self-instructional Module. The subjects were reevaluated using PEADS QL and Rosenberg self-esteem scale. Post assessment was done after 4-week intervention programme, conducted 20 sessions. The score obtained was analyzed statically.

STATISTICAL INTERPRETATION

This study used a pre-post experimental design. Statistical difference was tested with the parametric paired sample t-test to determine any significant difference in parametric variables (weight, BMI,
PEDS QL, Rosenberg self-esteem scale). The level of significance was \( p < 0.05 \). Data were analysed with SPSS for windows.

**RESULT**

This study was taken up to show the effectiveness of Occupational Therapy intervention on overweight/obese children and its impact on their quality of life. Hypothesis of the study was to evaluate the effectiveness of occupational therapy intervention on quality of life of children with overweight/obesity who met the inclusion and exclusion criteria of the study. The finding shows that pre-study scores of children have hampered quality of life in all four domains (physical, emotional, social and school) of PEDS-QL Inventory and lower self-esteem scores. Result shows significant difference between pre and post scores in physical, emotional, social, school functioning and higher self-esteem scores. Study shows significant result at \( p \)-value <0.01 level for quality of life and self-esteem. The Physical Functioning scores of subjects have significantly increased post intervention from Mean of 341.66 to 493.33, \( t \)-value (16.482), emotional functioning from mean of 239.16 to 353.33, \( t \) value (11.493), social function from mean of 169.16 to 341.66, \( t \) value (12.752), school function from mean of 335.83 to 431.66, \( t \) value (9.619) and self-esteem from mean of 14.9 to 26, \( t \) value (39.501) shows significant improvement.

**GRAPH I**

**INTERPRETATION:** Shows comparison of pre and post physical function domain of PEDS-QL scale. The Physical Functioning scores of subjects have significantly increased post intervention from Mean of 341.66 to 493.33. This shows improvement in physical domain. Results are highly significant at the ‘\( p \)’ value of 0.01.

**GRAPH II**

**INTERPRETATION:** Shows comparison of pre and post emotional function domain of PEDS-QL scale. The Social Functioning scores of subjects have significantly increased post intervention from Mean of 239.16 to 353.33. This shows improvement in emotional domain. Results are significant at ‘\( p \)’ value of 0.001.

**GRAPH III**

**INTERPRETATION:** Shows comparison of pre and post social function domain of PEDS-QL scale. The social Functioning scores of subjects have significantly increased post intervention from Mean of 169.16 to 341.66. This shows improvement in social domain. Results are highly significant at the ‘\( p \)’ value of 0.01.

**GRAPH IV**

**INTERPRETATION:** Shows comparison of pre and post school function domain of PEDS-QL scale. The school functioning scores of subjects have significantly increased post intervention from Mean of 335.83 to 431.66. This shows improvement in school domain. Results are highly significant at the ‘\( p \)’ value of 0.01.
**DISCUSSION**

The aim of the study was to establish the role of occupational therapy to deal with the psychological issues faced by overweight or obese children.

In the present study there was significant improvement in the self-esteem of obese/overweight adolescents who participated in the occupational therapy program. These results were supported by Colleen Willoughby et al. who reported that self-esteem of children can be increased with the occupational therapy program.

The physical functioning domain of Peds QL shows significant improvements following occupational therapy program. These findings are in agreement with the findings of Pucci G C Rech et al. which reported that encouraging physical activity in obese children will be effective in promoting physical functioning. The emotional function domain of Peds QL shows significant improvements. Cornette et al. found that there was an emotional impact of being overweight/obese in children.

Occupational therapy was effective in improving social participation of obese/overweight children as these findings are consistent with Pizzi et al. who reported that occupational therapy contribute to an altitude shift in how obese children are viewed and encourage full participation of all children. Programs that address healthy physical and nutritional habits and routines for all children which help children achieve lifestyle changes. This may include school programs that address nutrition, physical activity, and social participation.

The school function domain has shown significant improvement following the Occupational therapy program. Anne Martin et al. concluded that multicomponent interventions targeting physical activity and healthy diet could benefit general school achievement, whereas a physical activity intervention delivered for childhood weight management could benefit mathematics achievement, executive function and working memory.

The Behavioral therapy was taken as a part of intervention and was effective in management of obesity which is supported by Jubbin Jacob et al. that the behavior therapy is useful in the treatment of pediatric obesity. The emphasis is given to two powerful strategies that are monitoring food intake and increasing physical activity.

The program was effective in school as reported by Sharma et al. who says that elementary school appears to be an ideal setting for childhood obesity prevention. Intervention given the last array of opportunities for promoting physical activities and nutritional education through practice and supportive environment.

**CONCLUSION**

The study aimed to show the Effectiveness of Occupational Therapy in Children with Overweight/Obesity and its Impact upon Quality of Life. The findings of the study reveal that occupational therapy intervention improves self-esteem and quality of life in children with overweight/obesity. It is concluded that occupational therapy addresses the prevention and concerns of obesity through a holistic and client centered approach to lifestyle through participation in activities that promote health.

**Ethical Clearance** – Nil

**Source of Funding** – Nil

**Conflict of Interest** – Nil

**REFERENCES**

2. World Health Organization (WHO). Obesity:


Intra-Rater and Inter-Rater Reliability of Foot Print Analysis Tool

Jyoti S Jeevannavar1, Sampada Kulkarni2, Bhavana Ankolekar2, Kiran P Nadgauda3, Kirtana Shilesh3, Reshma H. Bachgoudar4

1Associate Professor, 2Post Graduate Student, 3Intern, S. D. M. College of Physiotherapy, Dharwad, Karnataka, India, 4Lecturer of Statistics, S. D. M. College of Medical Sciences and Hospital, Dharwad, Karnataka, India

ABSTRACT

Background: An increasing awareness among parents with regard to the foot posture of their children, clinical evaluation has become necessary. Several researches have explored various clinical methods for foot posture measurement. However, studies investigating simple clinical techniques with standard tools are limited.

Objectives: To examine the inter-rater and intra-rater reliability and also sensitivity and specificity of a technique described by UB. Rao and B. Joseph in 1992 as compared to Staheli’s Arch Index (SAI) and Chipaux-Smirak Index (CSI)

Methods: Static foot prints of 16 normally developing asymptomatic children were subjected to the SAI, CSI and the technique described by U.B. Rao and B. Joseph, for assessment of the medial longitudinal arch. The footprints were classified into flat foot and non-flat foot and further subjected to data analysis.

Results: The tool tested had a strong to excellent intra-rater (test-retest) reliability with an ICC=1, at 95%CI. The tool also had strong to perfect inter-rater reliability with K= 0.84–1. The tool when compared with CSI and SAI had 100% positive predictive value and specificity. The tool had a higher level of sensitivity with CSI as compared to SAI.

Conclusions: The tool described by U. B. Rao and B. Joseph can be a simple and quick clinical foot print assessment tool for evaluation of flat foot in children as it has perfect intra-rater (test-retest) reliability and strong to perfect inter-rater reliability.

Keywords: Flatfoot; Footprint analysis; Intra-rater reliability; Inter-rater reliability; Sensitivity and Specificity.

INTRODUCTION

The foot and ankle consist of 26 bones, >100 muscles, ligaments tendons, 23 joints and a network of nerves, skin, blood vessels and soft tissue.1 Based on the structure of the medial longitudinal arch, three types of foot have been proposed: (1) normally aligned or normal foot, (2) low arched or pronated foot, or pes planus, and (3) high arched or supinated foot, or pes cavus.2 Numerous methods of foot assessment are known. Radiographs are a direct and reliable method of medial longitudinal arch measurement, but less applicable in large scale studies involving children due to the cost and risk of radiation exposure.3 Indirect methods of assessment, such as ink foot prints which are inexpensive, simple, fast, and non-invasive, have been correlated with radiographic method. Thus, making them a popular method of assessing the medial longitudinal arch.3

Reports have suggested that footprint analysis can be used for qualification, classification and monitoring of flat feet. The medial longitudinal arch can be measured from the footprints by using plentitude of indexes like...
Clark’s angle (footprint angle), Chippaux – Smirak index, Staheli’s arch index and Sztriter – Godunow index.4

Studies have reported the footprint index (0.970) as the most reliable footprint measurement, followed by the Staheli’s arch index (0.963), Chippaux- Smirak index (0.961), arch index (0.957), truncated arch index (0.933), and arch length index (0.818).4

During our search for review of literature on various methods of assessment for medial longitudinal arch measurement, we came across another still simpler clinical measurement technique described by Udaya Bhaskara Rao and Benjamin Joseph in 1992.5

OBJECTIVE

The objective of this study was to determine the reliability, sensitivity and specificity of the technique described by U. B. Rao and Benjamin Joseph in 1992 as compared to SAI and CSI.

MATERIALS AND METHODS

Inclusion Criteria

Normally developing children of both genders from 6 to 10 years of age were included in the study.

Exclusion Criteria

Children with cognitive impairment, history of lower limb fractures or trauma, developmental delay and congenital deformities were the excluded from the study.

Methodology

Prior permission was obtained from Dr. Benjamin Joseph (one of the author’s) for using their flat-foot assessment tool for this study.

The total sample size from power analysis was calculated (using G. Power Software, Version 3.1.9.2.) to be 16 with the parameters set at 2 tails, α error probability 5%, power of the statistical test (1-beta error probability) 95% and an effect size of 0.7 (α=0.5, power=0.95%, r>0.7). Considering that 20% parents would not consent for their child’s participation an additional 3 children were selected randomly. Therefore total sample size was rounded up to 20.

The protocol for this study was reviewed and approved by the Institutional Ethical Committee. 20 typically developing children from 6 to 10 years of age were randomly selected for participation in the study. Parents of these children were briefed about the method and purpose of the study. Parent of 1 child did not consent for their child’s participation and 1 child was identified to have a history of lower limb injury in the past during the preliminary demographic data collection. Thus 18 children whose parents consented for their child’s participation and also met the inclusion and exclusion criteria were recruited for data collection.

Written consent was obtained from the parents of the children. Static foot prints of these children were taken using non-toxic colour and subsequently subjected to the SAI, CSI and the technique described by U. B. Rao and B. Joseph, for assessment of the medial longitudinal arch.

SAI and CSI were employed to measure flatness of the footprint. The two indices were determined by drawing three lines: one at the minimal distance of the mid-foot region, one at the maximal distance of the forefoot area, and one at the maximal distance of the rear-foot region. (Figure 1)

The SAI (Figure 1) is the ratio of the minimal distance in the mid-foot region (mid-foot width CD) to the maximal distance in the rear-foot region (heel width EF).3,6

The CSI (Figure 1) is the ratio of the minimal distance in the mid-foot region (mid-foot width CD) divided by the maximal distance in the forefoot area (metatarsal width AB).3,6

The feet were classified into flat-foot and non-flat foot based on an SAI of 1 and CSI of >0.6 as flat foot, while values below these thresholds were considered to be indicative of non-flat foot.6

The foot prints were also classified according to the method described by U.B. Rao and B. Joseph (Figure 2).5

The measurements for CSI, SAI and the method described by U. B. Rao and B. Joseph were performed by a single physiotherapist with 16 years of experience for the purpose of sensitivity and specificity. The measurements were performed 2 weeks apart between each method, with the evaluator blinded to the identity
of the footprint.

The foot prints were measured using the method described by U.B. Rao and B. Joseph twice by 3 evaluators 2 weeks apart for testing the inter-rater and intra-rater reliability of the tool. The evaluators included a postgraduate student and 2 interns who were trained for the method of measurement followed by practice for 1 hr.

The data obtained was subjected to appropriate statistical analysis.

Figure 1: Method of calculation as per CSI and SAI

![Figure 1: Method of calculation as per CSI and SAI](image)

Figure 2: Method of foot classification as described by U.B. Rao and B. Joseph

![Figure 2: Method of foot classification as described by U.B. Rao and B. Joseph](image)

**RESULTS**

Statistical analysis was done using Statistical Package for the Social Sciences (SPSS) version 23.0. The descriptive statistics was first evaluated using Mean and Standard deviation for the baseline characteristics.

The foot prints of 16 children (11 girls and 5 boys) were subjected to foot print analysis. The data of 16 children’s 32 foot prints were subjected to statistical analysis.

<table>
<thead>
<tr>
<th>Table 1: Demographic Data of Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td><strong>BOYS</strong></td>
</tr>
<tr>
<td><strong>NUMBER (%)</strong></td>
</tr>
<tr>
<td><strong>MEAN AGE Years (S.D.)</strong></td>
</tr>
<tr>
<td><strong>MEAN HEIGHT in meters (S.D.)</strong></td>
</tr>
<tr>
<td><strong>MEAN WEIGHT in kgs. (S.D.)</strong></td>
</tr>
<tr>
<td><strong>MEAN BMI in kg/m.sq (S.D.)</strong></td>
</tr>
<tr>
<td><strong>FLAT FOOT</strong></td>
</tr>
<tr>
<td><strong>NON-FLAT FOOT</strong></td>
</tr>
</tbody>
</table>

Table 1 shows the demographic data of the participants. The age of the children ranged from 6 years to 10 years with the mean age of 8.28 (±1.6) years. The mean age of the girls and boys was 8.09 (±1.6) and 8.7 (±1.6) years respectively. The overall mean BMI was 12.75 (±1.6) kg/m.sq while it was 12.36 (±1.6) kg/m.sq and 13.6 (±1.6) kg/m.sq among girls and boys respectively. There were no significant differences in age, weight, height and BMI of the girls and boys.

The intra-rater and inter-rater reliability were assessed in 32 feet of the 16 children.

The intra-rater (test-retest) reliability between day 1 and day 8 footprint analysis using the method described by U. B. Rao and B. Joseph was tested using Pearson’s Correlation Coefficient. The tool was found to have perfect reliability with an r=1. The p value from Pearson’s r was found to be significant at p<0.001. The tool was found to have an excellent intra-rater reliability with an ICC=1, at 95%CI. The ANOVA summary showed the result to be statistically significant with p<0.0001. (Table 2)
Table 2: ANOVA Summary of Intra-rater Reliability for the 3 Raters

<table>
<thead>
<tr>
<th></th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rater 1</td>
<td>Between pairs</td>
<td>7</td>
<td>31</td>
<td>0.2258</td>
<td>Infinity</td>
</tr>
<tr>
<td></td>
<td>Within pairs</td>
<td>0</td>
<td>32</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>7</td>
<td>63</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rater 2</td>
<td>Between pairs</td>
<td>5.4375</td>
<td>31</td>
<td>0.1754</td>
<td>Infinity</td>
</tr>
<tr>
<td></td>
<td>Within pairs</td>
<td>0</td>
<td>32</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>5.4375</td>
<td>63</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rater 3</td>
<td>Between pairs</td>
<td>5.4375</td>
<td>31</td>
<td>0.1754</td>
<td>Infinity</td>
</tr>
<tr>
<td></td>
<td>Within pairs</td>
<td>0</td>
<td>32</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>5.4375</td>
<td>63</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* p<0.05 was considered as statistically significant

Table 3: Kappa Scores for Inter-rater Reliability

<table>
<thead>
<tr>
<th>Evaluator 1</th>
<th>Evaluator 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evaluator 2</td>
<td>0.84</td>
</tr>
<tr>
<td>Evaluator 3</td>
<td>0.84</td>
</tr>
<tr>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>

Table 3 shows Inter-rater Reliability using the Cohen’s Kappa test. Based on the 95% confidence interval (CI) of the ICC estimate, values of K 0–20, 0.21–0.39, 0.40–0.59, 0.60–0.79, 0.80–0.90 and >0.90 are indicative of none, minimal, weak, moderate, strong and almost perfect reliability, respectively.7

A strong agreement was found to be present between Evaluator 1 and Evaluator 2 and also Evaluator 1 and Evaluator 3 at K=0.84. A perfect agreement was found to be present between Evaluator 2 and Evaluator 3 at K=1.

The Fleiss’ Kappa for 3 raters was 0.8973, SE=0.1021, and the 95% CI=0.6973-1.0974. A k=0.81-1 denotes the inter-rater reliability as almost perfect agreement between the three raters.8

Table 4: Sensitivity and Specificity of the tool with CSI and SAI

<table>
<thead>
<tr>
<th>Tool being tested</th>
<th>CSI</th>
<th>SAI</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Value</td>
<td>95% CI</td>
</tr>
<tr>
<td>Sensitivity %</td>
<td>57.14</td>
<td>18.41 - 90.1</td>
</tr>
<tr>
<td>Specificity %</td>
<td>100</td>
<td>86.28 - 100</td>
</tr>
<tr>
<td>Negative likelihood ratio</td>
<td>0.43</td>
<td>0.18 - 1.01</td>
</tr>
<tr>
<td>Flat foot Prevalence %</td>
<td>21.88</td>
<td>9.28 - 39.97</td>
</tr>
<tr>
<td>Positive predictive value %</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Negative predictive value %</td>
<td>89.29</td>
<td>77.99 - 95.15</td>
</tr>
<tr>
<td>Accuracy</td>
<td>90.62</td>
<td>74.98 - 98.02</td>
</tr>
</tbody>
</table>
Table 4 shows the sensitivity and specificity of the tool in comparison with CSI and SAI. The flat foot assessment by the evaluator (with 18 years of experience in the field of Paediatric Physiotherapy) using the method being tested was compared for sensitivity and specificity with CSI and SAI.

The tool when compared to CSI had a Sensitivity of 57.14%, i.e. it detected 57.14% of flat foot cases with the test result being positive in a flat foot prevalence of 21.88%. The high positive predictive value of 100% suggests that all those with flat foot would test positive for flat foot if analysed using the tool being tested. A negative likelihood ratio of 0.43 suggests that the flat foot outcome is not associated with the test results. The negative predictive value of 89.29% shows that 10.71% of flat foot cases may show a negative result with the assessment method.

The tool when compared to SAI had a Sensitivity of 50%, i.e. it detected 50% of flat foot cases with the test result being positive in a flat foot prevalence of 25%. The high positive predictive value of 100% suggests that all those with flat foot would be positive for flat foot if analysed using the tool being tested. A negative likelihood ratio of 0.50 suggests that the disease outcome is not associated with the test results. The negative predictive value of 85.71% shows that 14.29% of flat foot cases may show a negative result with the assessment method.

**DISCUSSION**

The data obtained from 16 children’s 32 feet was subjected to data analysis.

The intra-rater (test-retest) reliability of the tool was found to be perfect. Further the inter-rater reliability was found to have strong to perfect agreement within the raters.

The sensitivity and specificity of the tool with CSI was found to be 57.14% and 100% respectively.

The sensitivity and specificity of the tool with SAI was found to be 50% and 100% respectively.

**CONCLUSION**

The study concludes that this tool described by U. B. Rao and B. Joseph can be used as a clinical foot print analysis tool in children being evaluated for flat foot due to it’s perfect test-retest reliability and strong to perfect inter-rater reliability.

**Conflict of Interest** – The authors have no conflicts of interest to disclose.

**Source of Funding** – Self

**REFERENCES**

Utilization and Demonstration of Oral Motor Tools

Kaaynat Khan1, Shubha Arora1, Shama Tabassum2, Dimple Sharma3, Sana Hasan4

1Assistant Professor, Dept. of Rehabilitation Sciences, Jamia Hamdard, 2Consultant Occupational Therapist, Occupational Therapy Department, Old Eye Hospital, Rajigunj, Aurangabad, Bihar, 3Consultant Occupational Therapist, Child Development Centre, Satyabhama Hospital Private Ltd, Nangloi, New Delhi, 4Occupational Therapist, Occupational Therapy Unit, Berlin medical and neurological rehabilitation, Abu Dhabi

ABSTRACT

Oral motor skills are skills related to feeding and communication. These include intact sensory and motor function of the structures associated with it. Like tongue, jaw, lips etc. Many neurological and developmental disabilities demonstrate impaired oral motor function. There is difficulty in lip closure, diminished tongue movements, pocketing of food, dysphagia, and speech difficulties. Oral motor intervention comprises of active exercises, passive exercises and sensory stimulation. These techniques are being used in conjunction with medical intervention to improve function. The efficacy of these techniques has yet not been established due to lack of substantial evidence. Occupational therapists have been using these tools in their rehabilitative, biomechanical and sensory frame of references in patient care. This project was done to demonstrate utilization of different tools used to accomplish this goal. The tools were collected and some were made based on their efficacy in facilitating function. These tools were then utilized for patient care in targeted population to find its effectiveness.

Keywords: Chewing Gum, Dysphagia, Ice, Sucking Behavior, Vibration

INTRODUCTION AND BACKGROUND

Oral-motor skills are the movement of the muscles of the face (e.g., mouth, jaw, tongue, and lips). This includes muscle tone, muscle strength, the range of motion, speed, coordination, and dissociation (the ability to move oral structures, such as the tongue and lip, independently of each other). Clinical experience suggests that the acquisition and maturation of oral-motor movements underlie sound production and feeding skills (e.g., sucking, biting, and chewing).

Oral motor dysfunction can be seen in a variety of conditions such as neurological (facial nerve palsy, stroke, Parkinson), developmental disabilities (cerebral palsy, autism), head and neck surgery cases etc. Oral motor impairments are also seen in non-medically complex children in some study displayed mild/moderate oral-motor impairments and restricted their diets based on texture.

Oral dysphagia includes difficulty with lip seal, trouble chewing, trouble forming a bolus, nasal regurgitation. Pharyngeal dysphagia includes difficulty initiating swallows, wet or gurgly vocal quality, coughing, choking, the sensation of having something stuck in their throat. Patients with these challenges are at greater risk for choking, pneumonia, respiratory infections, dehydration, and even aspiration that occurs when food enters the airway.

Children with developmental disabilities may demonstrate oral-motor patterns that are not observed in typical development. Atypical oral-motor patterns include jaw thrusting, tongue thrust, tonic bite reflex, lip retraction, tongue retraction, and nasal regurgitation.

Clinicians working with a population who have feeding and swallowing problems frequently incorporate oral-motor movements into their treatment plans. There are three main categories of intervention generally used...
in clinical practice: active exercises, passive exercises, and sensory applications.

Active exercises include, but are not limited to, active range of motion, stretching, and strength training. These exercises are used to increase strength, endurance, and power.

Passive exercises may include massage, stroking, stimulation, tapping, vibration, and passive range of motion exercises in which the exercises are provided with the assistance of or entirely through the clinician or caregiver with little action from the individual receiving treatment. These procedures are applied to provide sensory input, improve circulation, and preserve or enhance joint flexibility. It has been theorized that some of these techniques normalize feeding patterns by reducing abnormal oral reflexes, facilitating normal muscle tone, or desensitizing the oral region.

Sensory applications comprise the application of heat, cold, high-frequency vibration, or other agents to muscle tissues. Some (e.g. Cold) may be used to enhance sensory awareness to initiate a swallow response.

However, there is insufficient evidence to determine the effects of oral motor exercises on children with oral sensorimotor deficits and swallowing problems. Well-designed studies are needed to provide clinicians with evidence that can be incorporated into the preferences of the client and the clinicians’ knowledge of anatomy, physiology, and neurodevelopment in the management of this group of children.

A team approach is a key to successful rehabilitation. Oro-motor therapy is the most useful non-surgical option. Drugs are unsuitable for long-term use due to adverse effects causing serious medical complication or non-compliance.

This area is often overshadowed by other major impairments in spite of its functional impairment in feeding. The formation of this kit will provide a rich sample on the topics of oro-motor treatment.

The kit will be emphasizing on the treatment of oro-motor problems that are essential in pediatric and neurological occupational therapy and gives much more weight on preparation for the long term and short term goals for the treatment of these.

**MATERIALS AND METHOD**

**Formation of kit**

Collection and development of different materials were done to form a kit which included and some were handmade.

**Active exercises**

1. Oral screen
2. Sucking activities
   - Sipper
   - Nipples
   - Straw
3. Jaw activities
   - Chewing gum
   - Chewy tubes
4. Mirror
5. Blowing activities
   - Bubbles
   - Thermacol balls
   - Balloon
   - Whistles
   - Candle and matchsticks
6. Tongue movements
   - Brush and honey
   - Tongue depressor

**Passive exercises**

1. Tape

**Sensory stimulation**

1. Vibrator
2. Finger brush
3. Ice cube tray
4. Nuk brush
5. Electric brush

Following components of the kit were constructed by the authors:

**Oral screen**

- Take a thin steel wire and shape it according to the oral curvature up to the premolar level.
- Turn the wire 3 mm up and down in opposite
directions.

• Heat thermoplastic material. Place it on a piece of oral denture and insert wire in it, allow it to cool, cut and shape the edges.

Tongue depressor

• Cut the Velcro material and sanding paper of 8 cm length.
• Take the ice cream stick and stick the material on it.

Finger brush

• Soft finger base
  Cut the brush head and paste it on the glove finger.
• Hard finger base
  Cut the brush head and paste it on to plastic cover.

The indication and contraindication of the components of the kit are as follows:

Mirror acts as a feedback during the independent practice of active movements. It is contraindicated in the case of visual hypo-responsive people.

Thermacol and Bubbles blowing are indicated in oro-motor weaknesses, impaired breathing control and oral motor incoordination. These are contraindicated in the respiratory compromised patient, children below age 6 and IQ less than 50. Balloon blowing is indicated in oro-motor weaknesses, hypotonic muscles synkinesis, oropharyngeal and esophageal motility, and oral motor incoordination. Whistle and candle blowing are indicated in facial nerve palsy, Bell’s palsy hypotonicity, and oro-muscular weakness. These are contraindicated in children below age 3.

The oral screen is indicated in oro-motor weakness; thumb-sucking, tongue thrusting, and lip biting. It is contraindicated in cleft lip and palate.

Chewing gum is indicated in hypersensitivity, low muscle tone, Fragile x syndrome, oral muscle weakness. These are contraindicated for low arousal child. Tort and sour candy increase arousal level. The Chewy tube is indicated in hypersensitivity of mouth, sore gum, and pain, hyposensitivity, strengthening of jaw muscles. It is contraindicated in children above 6 yrs and bleeding of gums.

Taping is indicated in hypertonic muscles. It is contraindicated in skin allergies.

The tongue depressor is indicated in tongue retraction and tongue thrust and loss of gustatory sensations. It is contraindicated in the patient with the lightened gag reflex. Honey and brush to elicit tongue movements are indicated in tongue protrusion, low muscle tone, small mouth and is contraindicated for drooling.

The finger brush is indicated in ASD, oral hygiene, oral facial hypersensitivity, Oral dyspraxia, Down’s syndrome, laryngeal instability, teething pain, improper tongue clearance, tender gums. Vibrator stimulation is indicated in sensory deficits, Oral muscle weakness, hypertonic muscle. It is contraindicated in bleeding of gums, tooth abscess, broken jaw or other facial bones, facial cancer and other conditions like eczema, psoriasis, cold sores etc. Ice cubes stimulation is indicated in altered muscle tone, drooling, weakness of jaw muscle and contraindicated in cases of cold sensitivity, compromised blood circulation, frostbite, and diabetes. The electric toothbrush is indicated in altered muscle tone and contraindicated in children below 3 yrs of age. Nuk brush indicated in oral hypersensitivity, hypotonicity, and oral aversion.

Sippy cup drinking is indicated in hypotonia, drooling, approximation problem. It is contraindicated in swallowing difficulties. Straw indicated in ulvo pharangeal insufficiency, for the client recovering from the stroke, Down syndrome with sucking inhibited. It is contraindicated in feeding and swallowing difficulties. Nipples indicated in tongue thrust and contraindicated in cleft palate.

Applicability and Findings

The kit was applied on two cases

A 2 yrs. old girl born at 30 weeks of gestational age, having hyperbilirubinemia along with respiratory distress. Mother reported that she had difficulty feeding through the bottle and would spit out pureed food when presented. On evaluation, she demonstrated a strong sucking pattern, but had poor tongue lateralization or graded bite, had unstable jaw while drinking from a cup and had hypersensitivity in and around her mouth. We intervened by stroking a warm, wet washcloth around her mouth and rubbing gum and palate. Nuk toothbrush used to rub gum and introduces food tastes and textures. Nipple with therapist’s finger inside dipped into baby food and pressed onto anterior tongue and gum. As tolerance increase latex covered spoon with pureed food
was introduced. Jaw support provided to inhibit her jaws excessive movement and promote tongue movement.

19 yrs. old with the history of a delayed birth cry of approx. 10 min. The mother complained of excessive drooling and inability to eat any kind of food. On evaluation, he demonstrated impaired sucking, retracted tongue, lip protraction and hypotonicity of facial muscles. On intervention it was recommended to suck thermacol ball through the straw, blow bubbles and candle. He was asked to chew chewing gum for jaw strength blow whistles, taping of hypotonic muscles were to be done, stimulation of muscle through vibrators and electric brush were prescribed.

After giving the aforementioned intervention plan as a home program, the effectiveness of the program was subjectively reported to be efficient.

CONCLUSION

As an occupational we are exploring the oro-motor area so we have collected the material for oromotor dysfunction. This has widened the scope in sensory, biomechanical and rehabilitative frame of references.

Conflict of Interest: No potential conflict of interest was present

Source of Funding: Self

Ethical Clearance: The case studies were taken from the general public.

REFERENCES


cherabfoundation.org/2013/horns-as-therapy-tools-by-sara-rosenfeld-johnson-ms-ccc-slp/


Early Detection of Potential Scoliosis in Elementary School Student of Banjarmasin: Result of Three Examination Models

Farida Heriyani¹, Hendra Haika Prayudha², Galih Adji Pratama², Muhammad Fahrizal Khairullah², Zairin Noor³,⁴
¹Department of Public Health, ²Medical Education Program, ³Department of Orthopaedics and Traumatology, Medical Faculty, Lambung Mangkurat University Banjarmasin, ⁴General Hospital of Ulin Banjarmasin

ABSTRACT

Scoliosis is the most common spinal disorder. Early detection of potential scoliosis has an important role in preventing damage and spinal disorders that worsen. Early detection of scoliosis for children is very important in order to prevent progressivity of the scoliosis curves. This study aims to determine the number of potential scoliosis in fifth and sixth-grade primary school students in Banjarmasin using three different examinations. The method of this study is using observational descriptive. Data were obtained using Scoliometer, Visual Inspection Physical Examination, and C7 Plumb Line Test on 127 students. The results showed that the number of students who have potential scoliosis was 33 students (25.98%) with scoliometer, 12 students (9.44%) with direct visual inspection physical examination, and nothing with C7 plumb line test. Students aged > 10 years have a greater percentage of potential scoliosis (27.5%) than students aged ≤ 10 years (25.3%) in scoliometer measurement, but vice versa in visual inspection. Female students have a greater percentage of potential scoliosis (36.73% with scoliometer and 16.33% with visual inspection) than in male students (19.23% and 5.13%).

Keywords: early detection, scoliosis, scoliometer, visual inspection, C7 plumb line test

INTRODUCTION

Scoliosis is the most commonly found spinal abnormality. Scoliosis is defined as the lateral curvature of the spine with a curve angle of greater than 10 degrees. When the body is viewed from the rear of the scoliosis patient, an abnormal curvature of the bone back toward the lateral shape like the letter “C” or the curve from side to side shaped like the letter “S”.

Prevalence of scoliosis worldwide reaches 1% of the population. Scoliosis affects 2-3% of the population in the United States or about 7 million people. Most scoliosis is diagnosed in children with an age range of 10 to 15 years. Scoliosis is most often found is idiopathic scoliosis of 85-90% of cases of scoliosis. In the Asian Continent alone, detectable scoliosis at screening / early detection of scoliosis has a prevalence of 0.4-7% .

Early detection of scoliosis for children is very important in order to prevent progressivity of the scoliosis curves and could be expected to worsen damage over the long-term. This is because the children’s skeletal system that still easy to change and its bad posture will be more easily repair and provide a better prognosis of the small curvature abnormality. If it left unchecked, it may develop to be severe scoliosis that will affect respiratory function and may affect to the patient’s psychological condition thus increasing probability on surgical intervention.

The American Academy of Orthopaedic Surgeons, The Scoliosis Research Society, the Pediatric Orthopaedic Society of North America, and The American Academic of Pediatrics recommend early detection of scoliosis. Early detection of scoliosis is not designed as a diagnostic method. The primary purpose of early detection is to find children with a high probability or potency rate for...
scoliosis events.\textsuperscript{10} The basic method of early detection of scoliosis in schools is a forward-bending examination of bent positions forward using a scoliometer (quantitative assessment).\textsuperscript{10} Qualitative assessment is chosen for this study as visual inspection physical examination.

Another examination in this study is by c7 plumb line test. This examination is done with a tool called plumb bob. Plumb bob is a conical tool made of iron and bonded with a rope. This tool works with the force of gravity. This tool is usually used by construction workers to see the slope of a building.\textsuperscript{11}

**MATERIALS AND METHOD**

This research uses the descriptive observational method, that research subject observed and measured. The population of this research is all students of a fifth and sixth-grade student in Muhammadiyah 8 and 10 primary schools Banjarmasin. The sample is determined by purposive sampling method with inclusion criteria ie students whose parents signed informed consent and present at the time of the research. This study took place at Muhammadiyah 8 and 10 primary school Banjarmasin conducted in August 2017. The Angle of Trunk Rotation measurements used the scoliometer tool on the students in Adam’s Forward Bending position. The examination of physic used Du \textit{et al}\hspace{1em}’s study with modification to determine the scoliosis potential. While the examination with c7 plumb line test is done by standing upright.

**FINDINGS AND DISCUSSION**

Table 1. Distribution of Potential Scoliosis on a fifth and sixth-grade student in Banjarmasin Generally August 2017 Period.

<table>
<thead>
<tr>
<th>Examination</th>
<th>Scoliosis Potential</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Positive</td>
<td>33</td>
<td>25.98</td>
</tr>
<tr>
<td></td>
<td>Negative</td>
<td>94</td>
<td>74.02</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>127</td>
<td>100</td>
</tr>
<tr>
<td>Scoliometer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Positive</td>
<td>12</td>
<td>9.44</td>
</tr>
<tr>
<td></td>
<td>Negative</td>
<td>115</td>
<td>90.56</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>127</td>
<td>100</td>
</tr>
<tr>
<td>Physical examination</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Positive</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Negative</td>
<td>127</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>127</td>
<td>100</td>
</tr>
</tbody>
</table>

Based on table 1 above, it can be seen that in a scoliometer examination 33 students have potential scoliosis (25.98%) consist of 27 students have intermediate potential scoliosis (21.26%), and 6 students with high potential scoliosis (4.72%). The results showed a 4.72% high potential scoliosis student in line with studies conducted by Kamtsiuris \textit{et al} in Germany in children and adolescents, that the overall prevalence of idiopathic scoliosis ranged from 0.47-52.2%.\textsuperscript{13} These results were also similar to those in the study conducted by Parera \textit{et al} in 2016 at Mapanget Manado in sixth-grade student of the primary school that found 4% high scoliosis students.\textsuperscript{14} Detection of potential scoliosis was not designed as a diagnostic method but to find children with a high probability of scoliosis.\textsuperscript{10}

Based on the visual inspection physical examination results, 12 students (9.44%) were suspected having scoliosis potential due to the deformity appearance of hump, shoulder and hip asymmetry, and lateral curvature of the spine. The study results are not much different than the previous literature reports. The results of Du \textit{Q et al} study (2016) showed 6.47% scoliosis potential based on visual inspection physical examination and the results of Guo \textit{Y et al} study (2017) showed 9.76% scoliosis potential.\textsuperscript{12,15}

On the other result with C7 plumb line test, there was not found a potential scoliosis student (see table 1). Most of the children detected have shown a deviation in the spine. However, the deviation is still < 3 cm, so it can not be said to have the potential of scoliosis. This corresponds to the prevalence of scoliosis in the world, which is 1% of the total human population.\textsuperscript{4} Based on a recent study in 2013 that collected various data about scoliosis in the world, scoliosis prevalence of 0.47 to 0.52%.\textsuperscript{16}

There is a difference of minimum standard deviation in the examination with c7 plumb line test, also affect the results of this research. Another citation says that if the deviation is $> 2$ cm have potentially scoliosis.\textsuperscript{17} However, in this study using standards established by Scoliosis Research Society (SRS). SRS is one of the world organizations that provide a recommendation on the early detection of scoliosis, which is potentially scoliosis if deviation $\geq 3$ cm.\textsuperscript{18,19}
Table 2. Distribution of Spinal Deviation on Students of Grade V and VI SD Muhammadiyah 8 and 10 Banjarmasin in 2017

<table>
<thead>
<tr>
<th>Deviation (cm)</th>
<th>Students</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>43</td>
<td>33.8</td>
</tr>
<tr>
<td>0.1 - 0.5</td>
<td>26</td>
<td>20.5</td>
</tr>
<tr>
<td>0.6 – 1</td>
<td>35</td>
<td>27.6</td>
</tr>
<tr>
<td>1.1 – 1.5</td>
<td>14</td>
<td>11</td>
</tr>
<tr>
<td>1.6 – 2</td>
<td>7</td>
<td>5.5</td>
</tr>
<tr>
<td>2.1 – 2.5</td>
<td>2</td>
<td>1.6</td>
</tr>
<tr>
<td>Total</td>
<td>127</td>
<td>100</td>
</tr>
</tbody>
</table>

Based on table 2, it can be seen the children that were found a deviation in the spine is 84 students. The ranges of deviation found from 0.2 cm to 2.5 cm. Two students with a 2.5 cm deviation are female. Two points five-centimeter deviation is close enough to the minimum standard of scoliosis potential (≥ 3 cm), so they need more monitoring.

Scoliosis develops faster at puberty. Accelerated development of spinal deformities in scoliosis occurs during an adolescent growth spurt. During the period of a growth spurt, muscle and bone stiffness occurs. High growth rates have side effects on bone strength, making it more prone to abnormalities. The growth spurt in young women occurs at age 10-12 years, whereas in men 13-14 years. Early detection is recommended for children at puberty. Imbalances of the endocrine system during puberty lead to impaired metabolism of water and minerals that ultimately lead to bone relaxation of the skeleton. It also affects the metabolism of the connective tissue on the intervertebral discs that will decrease the disc power when there is torsion (rotation) of the spine. It will eventually lead to the development of scoliosis.

Spine curvature in patients with scoliosis can occur in the cervical, thoracic or lumbar vertebrae. With radiological examination, the curvature of the spine will be C or S. In each scoliosis patients have different types of curvature and degree of severity. It causes that not all scoliosis patients will have a spinal shift.

Table 3. Distribution of Potential Scoliosis Using Scoliometer and Physical Examination on a fifth and sixth-grade student in Banjarmasin by age August 2017 Period

<table>
<thead>
<tr>
<th>Age</th>
<th>Examination</th>
<th>Potentially Scoliosis</th>
<th>No Scoliosis Potential</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>≤ 10 years</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scoliometer</td>
<td>22</td>
<td>25.3</td>
<td>65</td>
</tr>
<tr>
<td>Physical examination</td>
<td>10</td>
<td>11.5</td>
<td>77</td>
</tr>
<tr>
<td>&gt; 10 years</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scoliometer</td>
<td>11</td>
<td>27.5</td>
<td>29</td>
</tr>
<tr>
<td>Physical examination</td>
<td>2</td>
<td>5</td>
<td>38</td>
</tr>
</tbody>
</table>

There are 6 out of 127 samples are students with high potential scoliosis of 4 in ≤ 10 years old. The percentage of students with high potential scoliosis at age > 10 years was 5%, while at age ≤ 10 years was 4.6%. Based on these data, the potential scoliosis was found to be greater in students aged > 10 years (27.5%) than students aged ≤ 10 years (25.29%). These results are in line with Yong et al research in Singapore and Parera et al in Mapanget Manado in elementary students, that the percentage of students with potential scoliosis at age 11 is higher than at age 10. Scoliosis tends to develop with age. The development of spinal deformities with scoliosis occurs during a growth spurt or accelerated growth during puberty.

Scoliosis potential prevalence using visual inspection physical examination at juvenile age (4-10 years) has not been studied. Wong’s study showed the scoliosis prevalence based on a positive result of scoliometer at age 9-10 years (juvenile) as many as 17.4% lower than in age 10-11 years as many as 42%. The scoliosis potential prevalence on age ≤ 10 years more in this study may be influenced by noncompliance factor in the placement of book packages and bags to the locker that provided by its school.
Table 4. Scoliosis potential prevalence of 5th and 6th-grade primary schools students according to gender in August 2017

<table>
<thead>
<tr>
<th>Age</th>
<th>Examination</th>
<th>Potentially Scoliosis</th>
<th>No Scoliosis Potential</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>Male</td>
<td>Scoliometer</td>
<td>15</td>
<td>19.23</td>
</tr>
<tr>
<td></td>
<td>Physical examination</td>
<td>4</td>
<td>5.13</td>
</tr>
<tr>
<td>Female</td>
<td>Scoliometer</td>
<td>18</td>
<td>36.73</td>
</tr>
<tr>
<td></td>
<td>Physical examination</td>
<td>8</td>
<td>16.33</td>
</tr>
</tbody>
</table>

Based on table 4 above, in the scoliometer examination result, students with potential scoliosis were more common in female (36.73%) than in male (19.23%). These results are in line with Parera et al research at Mapanget Manado in sixth-grade students, that scoliosis potential is more likely to be in female than in the male.14 The results also correspond to the study of Zhang et al in elementary school students in China that by gender, the prevalence of scoliosis in the female is higher than in male.26

Idiopathic scoliosis in adolescents is more common in females than in males, with a ratio of 3:1 at 10-11 years of age and increased to 11:1 at 12-13 years.13 This increase in the ratio is due to the onset of bone growth during a growth spurt in the female is faster than in male.27

Table 4 shows that in the physical examination result, the prevalence of female students with potential scoliosis were 8 out of 49 students (5.13%) higher than the male students as many as 4 out of 78 students (16.33%). These results support most previous literature that the prevalence of scoliosis is higher in female than in the male.12,15 the female/male ratio of this study is 1:2. In the previous study, Du Q et al12 reported a female/male ratio was 1:1.2 and Guo Y15 reported 1:3.13. Most studies reported a male/female ratio of scoliosis between 1:2.1 and 1:11.6 (1:2.1 for Greece, 1:2.4 for Korea, 1:2.6 for Turkey, 1:4.6 for Singapore, and 1:11.6 for Japan).15,28 Fred Mo states during the period of puberty growth primarily female, the ratio of scoliosis prevalence among female and male increased by 1.6:1 at the age 9-10 years and 6.4:1 at age 11-12 years.29

CONCLUSION

Students who have potential scoliosis were 33 students (25.98%) with scoliometer, 12 students (9.44%) with direct visual inspection physical examination, and nothing with C7 plumb line test. Students aged > 10 years have a greater percentage of potential scoliosis (27.5%) than students aged ≤ 10 years (25.3%) in scoliometer measurement, but vice versa in visual inspection. Female students have a greater percentage of potential scoliosis (36.73% with scoliometer and 16.33% with visual inspection) than in male students (19.23% and 5.13%).

Ethical Clearance: Before conducting the data retrieval, the researchers conducted a decent test of ethics conducted at the Faculty of Medicine, Lambung Mangkurat University, Indonesia to determine that this study has met the feasibility. Information on an ethical test that the study is eligible to continue. The feasibility of the research was conducted to protect the human rights and security of research subjects.

Source Funding: Self-funding from the authors did this study.

Conflict of Interest: The authors declare that they have no conflict interests.

REFERENCES
7. Deepak AS, Ong JY, Choon DSK, et al. The clinical...


Call for Papers / Article Submission

Indian Journal of Physiotherapy and Occupational Therapy has commenced publication since 2006. IJPOT will be published four times in a year.

Purpose & Scope: IJPOT is a multidisciplinary refereed journal devoted to disseminating rigorous research on all aspects of the physiotherapy and occupational therapy to enhance learning. The journal seeks to be a catalyst for multidisciplinary dialogue amongst researchers and practitioners worldwide in the fields of learning and cognition, education, and technology, with a view to improving practice and achieving real-world impact in technology enhanced learning.

The journal encourages research from theoretical perspectives, research reports of evidence based practice as well as praxis research work that focuses on the interface between theory and practice and how each can support the other. In addition, the journal strongly encourages reports of research carried out within or involving countries in the Asia—Pacific region.

Invitation to submit papers: A general invitation is extended to authors to submit journal papers for publication in IJPOT.

The following guidelines should be noted:

- The article must be send by E-mail in word only as attachment. Hard copy need not be send.
- The article should be accompanied by a declaration from all authors that it is an original work and has not been sent to an other journal for publication.
- As a policy matter, journal encourages articles regarding new concepts and new information.
- Article should have a Title
- Names of authors
- Your Affiliation (designations with college address)
- Abstract
- Key words
- Introduction or back ground
- Material and Methods
- Findings • Conclusion
- Acknowledgements • Interest of conflict
- References in Vancouver style.
- Please quote references in text by superscripting
- Word limit 2500-3000 words, MSWORD Format, single file

Our Contact Info:

Institute of Medico-Legal Publications
Logix Office Tower, Unit No. 1704, Logix City Centre Mall,
Sector- 32, Noida - 201 301 (Uttar Pradesh)
Mob: 09971888542, +91 120 429 4015
E-mail: editor.ijpot@gmail.com, Website: www.ijpot.com
CALL FOR SUBSCRIPTIONS

About the Journal
Print-ISSN: 0973-5666 Electronic - ISSN: 0973-5674, Frequency: Quarterly (4 issues per volume).

An essential journal for all Physiotherapists & Occupational therapists provides professionals with a forum in which to discuss today’s challenges-identifying the philosophical and conceptual foundations of the practice; sharing innovative evaluation and treatment techniques; learning about and assimilating new methodologies developing in related professions; and communicating information about new practice settings. The journal serves as a valuable tool for helping therapists deal effectively with the challenges of the field. It emphasizes articles and reports that are directly relevant to practice. The journal is internationally indexed and is also covered by Index Copernicus (Poland).

<table>
<thead>
<tr>
<th>Journal Title</th>
<th>Print Only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indian Journal of Physiotherapy and Occupational Therapy</td>
<td>INR 9000</td>
</tr>
</tbody>
</table>

NOTE FOR SUBSCRIBERS

- Advance payment required by cheque/demand draft in the name of "Institute of Medico-Legal Publications" payable at New Delhi.
- Cancellation not allowed except for duplicate payment.
- Claim must be made within six months from issue date.
- A free copy can be forwarded on request.

Send all payment to:

Institute of Medico-Legal Publications
Logix Office Tower, Unit No. 1704, Logix City Centre Mall, Sector-32, Noida - 201 301 (Uttar Pradesh)
Mob: 09971888542, Ph. No: +91 120 429 4015
E-mail: editor.ijpot@gmail.com, Website: www.ijpot.com
PHYSIOCON-1

1st PHYSIOTHERAPY CONFERENCE
SATURDAY, MARCH 2ND, 2019
VISHWA YUWAK KENDRA, CHANAKYAPURI, NEW DELHI

physioconindia@gmail.com
Mob. +91 783 855 1924
Ph. +91 120 429 4015
physiocon
physiocon
https://www.physiocon.in

For any query contact the Organising secretary

Dr Kavita Behal
Logix Office Tower, Unit No. 1704, Logix City Centre Mall Sector- 32,
Noida - 201 301 (Uttar Pradesh) Mob. +91 783 855 1924

Conference is academically supported by—Indian Journal of Physiotherapy & Occupational Therapy

Registered with Registrar of Newspapers for India (Regd. No. DELENG/2007/20988)