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A Case Report

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The Tarsal Twist Manipulation: A Case Report

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Abstract

Background and Purpose: Ankle joint injuries account for up to 34% of all athletic related injuries, with lateral ankle sprains comprising up to 85% of these ankle injuries. Clinical practice guidelines for ankle sprains are well-established and should be utilized in the management of lateral ankle sprains; however, it is unknown how lower extremity joint manipulation may add to the management of lateral ankle sprains. The purpose of this case report is to describe the outcomes of a 14-year-old male basketball player with a lateral ankle sprain who responded favorably to a Tarsal Twist manipulation.

Case Description: A 14-year-old male basketball player was seen in physical therapy for the management of a lateral ankle sprain. The patient experienced localized pain and swelling at the lateral ankle, pain with activity, decreased range of motion, weakness, and decreased balance. Treatment included standard of care, with the inclusion of a Tarsal Twist manipulation.

Outcomes: A test-retest method was utilized to determine the outcomes of the Tarsal Twist manipulation. Immediate improvements in the Star Excursion Balance Test and a decrease in pain with activity occurred after the Tarsal Twist manipulation. Following seven visits of physical therapy utilizing standard of care with the addition of the Tarsal Twist manipulation, the patient was able to return to basketball.

Discussion: A meaningful change in the Star Excursion Balance Test and pain during activity occurred immediately after the Tarsal Twist manipulation, suggesting that this manipulation was helpful for this patient.

Keywords: Extremity manipulation; Tarsal twist; Ankle sprain; Physical therapy; Case report.

Background and Purpose

The incidence of ankle sprains is highest in males between 14 and 24 years of age. Almost half of these ankle sprains will occur during athletic activity, with basketball being associated with the highest percentage of ankle sprains.[1] The ankle joint was found to account for 10% to 34% of all athletic related injuries, with lateral ankle sprains (LAS) comprising 77% to 85% of these ankle injuries.[2-5] The most common mechanism of injury for an LAS is combined ankle inversion and plantarflexion beyond the anatomical constraints, where one or more of the lateral ligaments of the ankle (the anterior talofibular ligament [ATFL], calcaneofibular ligament [CFL], and/or posterior talofibular ligament [PTFL]) are partially or completely torn. Up to 73% of LAS

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involve an isolated ATFL lesion, while the CFL and PTFL are less likely to sustain damaging tensile forces due to their anatomical locations.[2,5] Although an LAS is by definition an injury to the ligamentous structures, structures other than the lateral ligaments are also commonly injured and may contribute to pain, instability, and limitations in activities and participation.[6] These concomitant injuries include damage to the fibularis tendon, nerve injury, retinacular damage, and osteochondral lesions.[6,7]

The primary subjective report from patients experiencing an LAS is well localized pain and swelling of acute onset around the lateral ankle, specifically about the lateral malleolus, calcaneus, talus, and/or cuboid, immediately following an inversion event.[5] An LAS is diagnosed clinically based on a detailed history, mechanism of injury, and physical examination. The *Lateral Ankle Ligament Sprains Clinical Practice Guidelines*[6] are used as the standard of care for the management of an LAS, which is consistent with the PEACE (Protect, Elevate, Avoid anti-inflammatory modalities, Compress, Educate) protocol during the acute stages of injury and the LOVE (Load, Optimism, Vascularization, Exercise) protocol once the acute phase has passed.[8]

A high-velocity low-amplitude thrust joint manipulation is an intervention which has a growing body of evidence supporting its use for the management of neck and back pain.[9-12] Evidence supporting manipulation as an intervention for lower extremity conditions is much less robust.[13] Therefore, the purpose of this case report is to describe the outcomes of a 14-year-old male basketball player with an LAS who responded favorably to a Tarsal Twist manipulation.

Case Description

The patient was seen for physical therapy (PT) after experiencing a grade 2 ATFL and CFL sprain while playing basketball. The patient and treating clinician provided clinical information for this case presentation, and both the patient and patient's guardian provided informed consent to present this case.

Subjective History and Systems Review

The patient was a 14-year-old male with an athletic history in basketball and baseball who was referred to PT with the diagnosis of an unspecified ligament sprain of the right ankle. The patient had a past medical history of chronic ankle sprains and was otherwise healthy. He reported injuring his right ankle while shooting a lay-up during basketball practice two weeks prior to the initial PT evaluation, feeling several "pops" at the time of injury. He had a history of frequent ankle sprains; however, he stated that none had been as severe as the current episode. The patient experienced sharp pain at his lateral foot and ankle during ambulation that was relieved by rest. He also used an ankle brace to help decrease pain and improve function. The pain was localized to his lateral malleolus, lateral calcaneus, and talus. He rated his pain as 4/10 at best and 9/10 at worst on the Numeric Pain Rating Scale.

Examination

A thorough physical examination was performed on the patient by a licensed physical therapist with notable findings presented in **Table 1**. The patient presented with decreased strength, power, and stability as indicated by activity intolerance. He was unable to perform a unilateral squat or a lunge due to pain and was limited to a right single leg stance time of 5 seconds. Manual muscle testing on the right lower extremity (RLE) revealed 3+/5 dorsiflexion strength and 5/5 plantarflexion strength, both of which were painful. Patient could complete 30 heel raises on the left lower extremity (LLE) compared to 1 heel raise on the RLE. The results on the Star Excursion Balance Test[14] (SEBT) were 46 cm anteriorly, 63 cm laterally, and 60 cm posteriorly on the LLE and 43 cm anteriorly, 44 cm laterally, and 41 cm posteriorly on the RLE. Right ankle dorsiflexion range of motion was limited to -5°, indicating the inability to achieve a neutral position. The anterior drawer and talar tilt special tests were both positive, suggesting laxity in the right lateral ankle ligaments. The patient was also tender to palpation on the right ATFL and CFL.

Table 1. Summary of Symptoms and Physical Exam Findings

Symptoms	Physical Exam Findings
Localized R ankle pain at lateral malleolus, lateral calcaneus, and talus (pain ranging from 4-9/10)	Weakness in R ankle dorsiflexors (3+/5)
Pain worsens with ambulation and exercise	Pain and weakness in R ankle plantar flexors (1 heel raise on R, 30 heel raises on L)
	Decreased ROM R ankle: Dorsiflexion -5°
	Asymmetric SEBT RLE: 43 cm anteriorly, 44 cm laterally, 41 cm posteriorly LLE: 46 cm anteriorly, 63 cm laterally, 60 cm posteriorly
	Tenderness to palpation on the R ATFL and CFL

Intervention

The patient underwent standard of care PT interventions for an LAS, including interventions to improve range of motion, strength, coordination, pain, and function consistent with the PEACE and LOVE approach described by Duboise and Esculier.[8] These interventions included single leg balance on foam, deadlifts, banded ankle mobilization with movement, barbell clean pulls, electrical stimulation, ice, therapeutic exercise combined with blood flow restriction, gait training, and joint mobilization. These interventions were progressed as indicated, respecting soft tissue healing constraints.

Tarsal Twist Manipulation

After being seen by the physical therapist for two weeks and progressing as expected, the treating physical therapist performed the Tarsal Twist manipulation as described by Kimbrough et al. (**Figure 1A-C**).[15] A test-retest method was utilized to determine the outcomes of this specific intervention (**Table 2**).

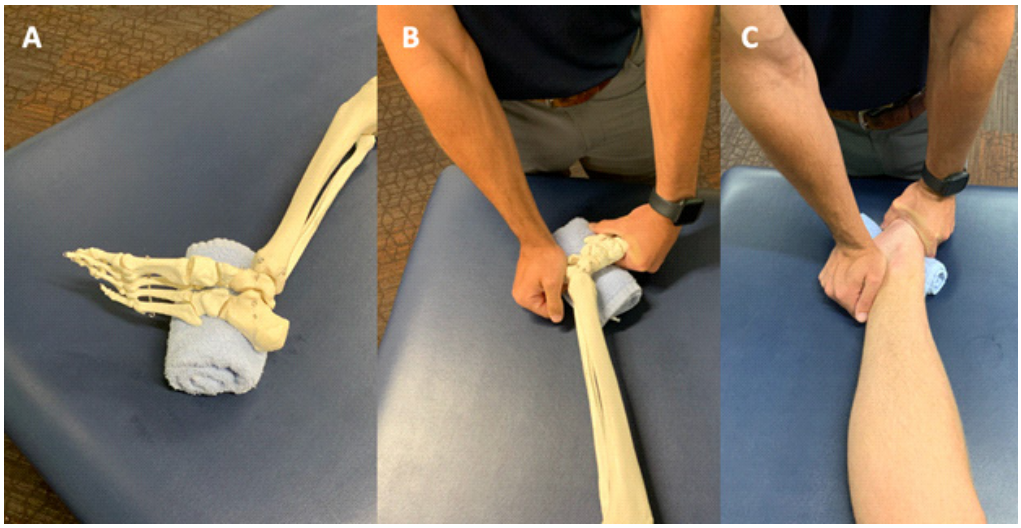

Figure 1: (A) Tarsal Twist manipulation set up with skeleton model, (B) clinician hand placement on skeleton model, (C) clinician hand placement on patient.

Table 2. Physical Exam Findings Pre- and Post- Tarsal Twist Manipulation

	Pre-Manipulation	**Post-Manipulation**
RLE SEBT	55 cm anteriorly	70 cm anteriorly
Single leg heel raises on right	20 with report of pain beginning on repetition 12	20 with no report of pain
Pain with activity	2/10 while jogging on the Alter-G treadmill	0/10 while jogging on the Alter-G treadmill
Single Leg Balance Test	30 seconds	30 seconds

Outcome

Following seven visits of physical therapy utilizing standard of care for LAS with the addition of a Tarsal Twist manipulation, the patient demonstrated functional improvements and was able to return to basketball without reservations. The authors would like to highlight the objective improvements immediately after the Tarsal Twist manipulation (**Table 2**), specifically improvements in anterior reach on the SEBT (**Figure 2**) and decreased pain with activity (**Figure 3**).

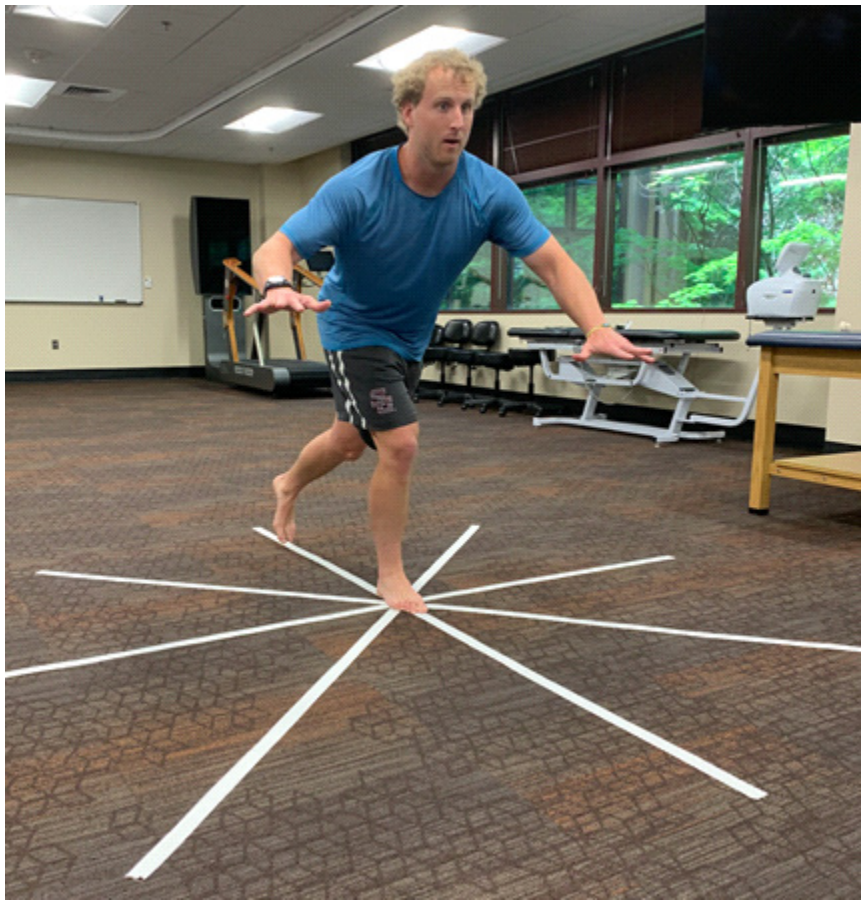

Figure 2: Star excursion balance test.

Figure 3: Single leg heel raises.

Discussion

This case report discusses the utilization of the Tarsal Twist manipulation in the management of a pediatric patient after a lateral ankle sprain in conjunction with standard physical therapy care for the management of a LAS. Existing evidence and literature on manipulations in the management of pediatric patients is limited.[16]

In walking and running, the ground reaction forces at the ankle can vary from between 1,000 N and 2,000 N in adult individuals.[17] These ground reaction forces on the ankle while walking and running are greater than the 365 N required to manipulate the spine[18] or the 165 N to manipulate the metacarpal-phalangeal joints.[19] It can be assumed that active musculature and neighboring joints are able to help attenuate the ground reaction forces during walking and jumping; however, the large discrepancy between these ground reaction forces and forces required for joint manipulation suggest tarsal twist manipulation is safe, even in the pediatric patient.

Although a case report of a single subject does not infer a cause-and-effect relationship, a meaningful change in this patient's status occurred immediately following a Tarsal Twist manipulation, suggesting that the Tarsal Twist manipulation was beneficial.

This case report has multiple limitations. The clinician and patient were not able to be blinded to the Tarsal Twist manipulation or outcomes, which may have biased the results. This patient also had a diagnosis that has shown to improve with conservative care without utilization of the Tarsal Twist manipulation.[20] The natural recovery of an LAS typically allows for a rapid decrease in pain and improvement in function in the first 2 weeks post-injury.[20] However, this does not fully account for the objective and immediate improvement this patient experienced after receiving the Tarsal Twist manipulation.

As the results of a case report cannot be generalized to other patients, additional research is needed to determine the effectiveness of implementing the Tarsal Twist manipulation into physical therapy management in a greater number of subjects. The authors would suggest expanding a case series or designing a randomized controlled trial to further examine the effectiveness of the Tarsal Twist manipulation.

Conclusion

This case report describes the management of a patient with an LAS. PT management consisted of standard of care with the addition of a Tarsal Twist manipulation. The results of this case report indicate that the Tarsal Twist manipulation can produce immediate improvements in SEBT and a decrease in pain during activities.

Ethical Clearance: The patient and treating clinician provided clinical information for this case presentation, and both the patient and patient's guardian provided informed consent to present this case.

Source of Funding: Self

Conflict of Interest: Nil

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Original Article

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Effects of Respiratory Muscle Training (RMT) on Ventilatory Parameters and Respiratory Muscle Strength (RMS) in Different Postures of the Rowing Stroke in Elite Rowers of Sri Lanka

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Abstract

Background: Rowing places 'extreme' demands on ventilation due to the cramped body posture during the rowing stroke. The aim of this study was to investigate the effects of a 12-week respiratory muscle training (RMT) program on ventilatory parameters and respiratory muscle strength (RMS) in different postures of the rowing stroke in professional male rowers in Sri Lanka. Methods: Twenty national male rowers, aged 20-35 years were grouped randomly into an experimental (n=11) and a control (n=9) group. Prior to the study, baseline measurements of ventilatory functions (spirometry) and RMS were assessed by a portable spirometer and hand held mouth pressure meter respectively. Subsequently, rowers in the experimental group were prescribed a RMT program comprising of breathing and abdominal exercises while control group was prescribed a general exercise program for 12 weeks after which all the above parameters were assessed again.

Conclusion: Ventilatory functions and RMS were not statistically significant amongst the different rowing postures ($p>0.05$). Ventilatory functions were observed to be significantly higher in the experimental group than the control group following the respective training programs ($p<0.05$). The novel RMT program had a beneficial effect in improving the ventilatory functions in the experimental group in the different postures of the rowing stroke.

Keywords: Posture; Respiratory muscle training; Rowing; Ventilatory functions.

Introduction

The sport of rowing requires high degree of energy capacity compared to other sports as almost all muscles of the body work maximally during the rowing stroke. During a single rowing stroke, a rower adopts different postures which consist of four major phases; catch, drive, finish and recovery phase. The catch phase is 75^o to the horizontal with the trunk flexed forward with flexion at the hip, knee and ankle. During the drive phase, the trunk extends >90^o and the legs pushes the body backward. The posture

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adopted by the rower at the finish phase is lumbar extension with 110º to 150º to the horizontal. The 'recovery' phase can vary from 110º to 75º where the rower comes back to the position of the catch phase.[1]

During rowing, the respiratory muscles are confronted with several demands with the muscles involved not only sustaining extremely high levels of ventilation but also maintaining postural and trunk control.[2,3] The changes in trunk posture during the rowing stroke places severe demands on the breathing cycle.[4] This emphasizes the importance of the interrelationship of breathing and the rowing stroke. Therefore, proper breathing technique is of paramount importance for rowing performance.[5] Hence, elite experienced rowers have been trained to synchronize the breathing pattern to the rowing stroke with one expiration per drive and one inspiration during recovery or one complete breath during the drive and one complete breath during the recovery.[4]

Many studies have investigated the effectiveness and usefulness of RMT in enhancing respiratory functions and sport performance in healthy people[6,7,] in patients with cardiorespiratory diseases[7,8] and in trained athletes[5,9]. Thus, the aim of this study was to examine the effects of a 12-week RMT program on ventilatory parameters and respiratory muscle strength in different postures of the rowing stroke.

Materials and Methods

Study design and participants

A case-controlled randomized study was conducted in twenty (20) age, height and weight matched male rowers (experimental group n = 11; control group n= 9) aged between 20-35 years during the competitive period. The measurements and test assessed included anthropometric profile, lung volumes, capacities and flow rates and respiratory muscle strength. Ethical approval was obtained from Ethics Review Committee, Faculty of Medicine, University of Peradeniya, Sri Lanka (2016/EC/52).

Test procedure

Prior to the study, baseline measurements of spirometry were assessed using a portable spirometer (Spiro analyzer ST-75).

Respiratory muscle strength (RMS) which includes inspiratory muscle strength (IMS) and expiratory muscle strength (EMS) were assessed by maximal inspiratory mouth pressure (PImax) and maximal expiratory mouth pressures (PEmax) respectively using a mouth pressure meter in all rowers.

Both spirometry and RMS were measured 3 times in each posture namely; catch phase (75º), upright seated (90º) and finish phase (130º) with an interval of at least 10 min between the postures. These positions were designed to simulate relevant postures performed during a normal rowing stroke. The postures were assigned supported by a bench. A goniometer was positioned on the supporting bench adjacent to the lumbar region of the spine to determine the joint angle of the back when performing the breathing maneuvers. Using a goniometer, manual assistance was provided to get the participant into the appropriate posture. Once in the correct posture, participants performed the designated breathing maneuver and were required to maintain the specified posture and head and neck alignment throughout the entire maneuver. The participants were required to perform all measurements three times in one session.

Subsequently, rowers in the experimental group were prescribed a respiratory muscle training program while the control group was prescribed a "general exercise program" describes for non-respiratory muscles for a 12-week period. All the above parameters were assessed again in the two groups after the 12-week exercise programs in the three different rowing postures.

Rowers in both groups followed a same warm-up exercise session prior to performing their respective training programs.

Results

The mean and standard deviation (SD) of age, body mass index, chest expansion and rowing experience in the control (n=9) and the experimental groups (n=11) were (26.1 $\pm$ 4.2 vs 24.7 $\pm$ 5.3 years); (22.7 $\pm$ 2.7 vs 22.5 $\pm$ 2.3 kg/m^2); (5.6 $\pm$ 1.7 vs 4.5 $\pm$ 1.3cm); (3.1 $\pm$ 2.3 vs 5.3 $\pm$ 2.5 years) respectively.

As shown in Table 1 the means±SD of PEF, FVC, FEV_1 were slightly higher in the 75º - catch phase of the rowing stroke compared to 130º - finish and 90º - upright seated positions when considering the total sample. Expiratory muscle strength (EMS) was higher than inspiratory muscle strength (IMS) in all three rowing postures. During 75º catch phase, both IMS (111.6 ± 26.7 mmHg) and EMS (155.3 ± 33.9 mmHg) were higher compared to 90º upright seated position and 130º finish phase of the rowing stroke. However, no significant difference was observed in the respiratory parameters in the three different rowing postures ($p>0.05$).

Table 1: The Effects of Rowing Postures on Respiratory Parameters in the Study Population (n = 20)

Respiratory Parameters	130º Finish Mean ± SD	90º Upright seated Mean ± SD	75º Catch Mean ± SD	F	p value
PIF (L/s)	12.1 ± 0.3	12.3 ± 0.6	12.3 ± 0.5	0.51	0.57
PEF (L/s)	13.0 ± 1.4	13.6 ± 3.1	13.9 ± 1.3	0.01	0.97
FVC (L)	6.1 ± 1.7	6.3 ± 1.8	6.8 ± 3.1	0.12	0.85
FEV_1 (L)	4.9 ± 1.1	5.4 ± 1.1	5.6 ± 0.9	0.61	0.51
PImax (mmHg)	103.2 ± 26.7	106.7 ± 25.8	110.6 ± 30.1	1.76	0.18
PEmax (mmHg)	153.8± 41.9	155.2 ± 43.4	155.9 ± 39.0	0.13	0.85

[**PIF**: Peak Inspiratory Flow; **PEF**: Peak Expiratory Flow; **VC**: Vital Capacity; **FVC**: Forced Vital Capacity; **FEV_1**: Forced Expiratory Volume in one second and **(FEV_1/FVC):** Forced Expiratory Ratio; **SD** – Standard deviation]

The respiratory parameters namely; lung volumes, capacities, flow rates, inspiratory and expiratory muscle strength in the 3 different rowing postures before and after the respective training programs of the control and experimental groups are presented in Table 2 and Table 3 respectively. Significant higher mean values for the PEF in 75º catch phase, FEV_1 in the 130º finish phase and PImax in 90^0 upright seated positions were observed in the control group following the 12-week general exercise program. In the experimental group, there were significant improvements in PIF, PEF, PImax, PEmax in 130º finish phase, PEF, PImax, PEmax in the 90º upright seated position and PIF, PEF, FEV_1 , PImax, PEmax in the 75º catch phase.

Table 2: Respiratory parameters in the different rowing postures in the Control group (n=9) before and after 12-week Exercise Programs

Respiratory Parameters	130º – Finish phase Mean ± SD		90º- upright seated Mean ± SD		75º- Catch phase Mean ± SD	
	Pre training	Post training	Pre training	Post training	Pre training	Post training
PIF (L/s)	12.26 ± 0.6	12.8 ± 0.9	2.3 ± 0.4	13.0 ± 0.9	2.3 ± 0.6	12.9 ± 0.9
PEF (L/s)	13.8 ± 1.2	14.2 ± 0.7	13.3 ± 4.0	14.3 ± 0.7	13.4 ± 1.5	14.2 ± 0.9**
FVC (L)	5.8 ± 1.1	6.4 ± 1.6	5.8 ± 0.7	6.5 ± 2.2	5.8 ± 1.0	6.9 ± 1.3
FEV_1 (L)	5.2 ± 1.1	5.3 ± 1.1*	5.3 ± 0.5	5.5 ± 1.2	5.3 ± 1.0	5.8 ± 1.1

PImax (mmHg)	107.8 ± 24.2	133.4 ± 18.4	112.1 ± 20.9	135.6 ± 12.7**	119.3 ± 26.2	138.2 ± 20.2
PEmax (mmHg)	151.2 ± 44.9	185.5 ± 32.7	154.6 ± 42.0	189.8 ± 35.8	152.2 ± 40.2	182.1 ± 41.7

[**PIF**: Peak Inspiratory Flow; **PEF**: Peak Expiratory Flow; **VC**: Vital Capacity; **FVC**: Forced Vital Capacity; **FEV_1**: Forced Expiratory Volume in one second and **(FEV_1/FVC):** Forced Expiratory Ratio; **SD** – Standard deviation; *p< 0.05- Significant; **p< 0.01- Highly Significant]

Table 3: Respiratory parameters in the different rowing postures in the experimental group (n=11) before and after the 12-week RMT program

Respiratory Parameters	130^0 – Finish phase Mean ± SD		90^0- upright seated Mean ± SD		75^0- Catch phase Mean ± SD	
	Pre training	Post training	Pre training	Post training	Pre training	Post training
PIF (L/s)	12.4 ± 0.6	13.1 ± 0.9*	12.3 ± 0.7	12.7 ± 0.7	12.1 ± 0.4	13.8 ± 0.4*
PEF (L/s)	13.3 ± 1.7	14.4 ± 1.1**	14.1 ± 1.6	14.5 ± 2.2*	13.8 ± 1.3	14.6 ± 1.5*
FVC (L)	7.1 ± 1.9	7.1 ± 1.2	6.6 ± 2.3	6.9 ± 1.1	7.2 ± 4.1	7.2 ± 1.3
FEV_1 (L)	5.8 ± 1.2	6.0 ± 0.7	5.5 ± 1.5	5.6 ± 0.9	5.3 ± 0.9	6.1 ± 0.8**
PImax (mmHg)	99.4 ± 28.8	119.3 ± 25.9**	102.3 ± 29.4	119.2 ± 39.4*	103.4 ± 32.3	121.9 ± 31.4**
PEmax (mmHg)	156.0 ± 41.4	186.3 ± 51.9**	155.6 ± 46.5	190.5 ± 48.3*	157.6 ± 39.7	177.4 ± 45.7**

[**PIF**: Peak Inspiratory Flow; **PEF**: Peak Expiratory Flow; **VC**: Vital Capacity; **FVC**: Forced Vital Capacity; **FEV_1**: Forced Expiratory Volume in one second and **(FEV_1/FVC):** Forced Expiratory Ratio; **SD** – Standard deviation; *p< 0.05- Significant; **p< 0.01- Highly Significant]

Table 4 shows the comparison of the respiratory parameters in the different rowing postures between the control and the experimental group after 12 -week exercise Programs. All the spiromtric values improved in the 130^0 finish phase while there were higher means in PEF, FVC and FEV_1 in 90^0 upright seated position and PIF, PEF, FVC and FEV_1 in 75^0 catch phase in the experimental group compared to the control. However, the difference in the ventilatory parameters in the three different rowing postures between the control and the experimental group were not significant (p>0.05).

Table 4: Comparison of the effect of the 12-Week Training Program on respiratory parameters in the different rowing Postures between the Control (n=9) and the Experimental Group (n=11)

Respiratory Parameters	130^0 – Finish phase Mean ± SD		90^0- upright seated Mean ± SD		75^0- Catch phase Mean ± SD	
	Control	Experimental	Control	Experimental	Control	Experimental
PIF (L/s)	12.8 ± 0.9	13.1 ± 0.9	13.0 ± 0.9	12.7 ± 0.7	12.9 ± 0.9	13.8 ± 0.4
PEF (L/s)	14.2 ± 0.7	14.4 ± 1.1	14.3 ± 0.7	14.5 ± 2.2	14.2 ± 0.9	14.6 ± 1.5
FVC (L)	6.4 ± 1.6	7.1 ± 1.2	6.5 ± 2.2	6.9 ± 1.1	6.9 ±1.3	7.2 ± 1.3
FEV_1 (L)	5.3 ± 1.1	6.0 ± 0.7	5.5 ± 1.2	5.6 ± 0.9	5.8 ± 1.1	6.1 ± 0.8
PImax (mmHg)	119.3 ± 25.9	133.4 ± 18.4	119.2 ± 39.4	135.6 ± 12.7	121.9 ± 31.4	138.2 ± 20.2
PEmax (mmHg)	185.5 ± 32.7	186.3 ± 51.9	189.8 ± 35.8	190.5 ± 48.3	182.1 ± 41.7	177.4 ± 45.7

[**PIF**: Peak Inspiratory Flow; **PEF**: Peak Expiratory Flow; **VC**: Vital Capacity; **FVC**: Forced Vital Capacity; **FEV_1**: Forced Expiratory Volume in one second and **(FEV_1/FVC):** Forced Expiratory Ratio**; SD** – Standard deviation; *p< 0.05- Significant; **p< 0.01- Highly Significant]

Inspiratory (PImax) and expiratory muscle strength (PEmax) were higher in the experimental group compared to the control group during all three rowing postures (Table 4) after the exercise programs. Both in the experimental and the control groups, PImax and PEmax showed the highest value in the 75º - catch position and 90º–upright seated position respectively. However, no significant difference was observed in the PImax and PEmax, between the two groups (p>0.05).

Discussion

Existing studies on respiratory muscle training have mostly focused on improving pulmonary function and respiratory muscle strength in standing position through altering training intensities and training periods.[10, 11] However, there is a paucity of literature on how RMT would affect the respiratory parameters during the different rowing postures.

When considering the rowing postures of the rowers in the present study (total population), PEF, FVC and FEV_1 were slightly higher in the 75º - catch phase of the rowing stroke and decreased as the rower assumed a reclined posture with the lowest values seen in the 130º- finish phase, but these differences were not significant among three specific postures (Table 1). Our findings are consistent with previous studies done in healthy people that have demonstrated a significant reduction in spirometric values (FVC, FEV_1, PEF) when posture changed from the upright seated to supine position.[12,13]

During the 130º finish phase, isometric contraction of abdominals and intercostals muscles generates high inter-thoracic pressures to maintain trunk stabilization. This takes precedence over the movement of the rib cage and abdomen for ventilation, resulting in a decrease in lung functions[14, 15]. This could be the reason for the lung parameters to be lower in the 130º- finish phase compared to the 75º- catch phase. In addition, slightly lower values observed in FEV_1 in the 130^0 - finish phase compared to the other phases could be attributed to the fact that expiration is initiated from lower starting volumes as the rectus abdominal muscle is more involved in stabilization of the trunk than in lung expansion. This could decrease the ability to generate fast forced expiration in the supine or reclined postures.[13, 16]

To circumvent the problem of ventilatory demands during different postures during rowing, Olympic level elite rowers entrain their breathing pattern to the rowing stroke with one expiration per drive and one inspiration during recovery.[17]

However, the rowers in the present study do not follow this breathing technique and inspire during the catch phase and expire in the finish phase. This could be the reason rowers in this study showed slightly higher values in ventilatory parameters in the 75º-catch phase compared to the finish phase. But this could lead to respiratory muscle fatigue and decrease rowing performance.

There were no significant changes in PImax and PEmax values in the three different rowing positions of the rowers in the present study which shows that in healthy individuals the ventilatory muscles work efficiently even with alteration of body positions, which was also confirmed by Ogiwara and Miyachi[15]. However, it was seen that both PImax and PEmax values tended to be higher when body was in flexed and upright positions (75º - catch and 90º upright) compared to the horizontal positions in 130º finish phase. Several past studies showed that the sitting or half lying position tended to show higher mouth pressures compared to the horizontal position.[5,14,15]

Watanabe, in 1985 has suggested that the diaphragm is three to five times more active in sitting and standing positions than the horizontal lying down position enabling it to work more efficiently.[18] It has also been postulated that in seated postures gravity assists in the compression of the upper thoracic cage more easily than horizontal positions.[15] These changes in respiratory muscle strength in different postures can also be explained by change in the length-tension relationship. A study explained that in the seated position, the accessory inspiratory muscles of Scalene, Sternocleidomastoid and parasternal muscles are easily activated.[19] This helps in raising and enlarging the upper thoracic cage during inspiration which results in a higher PImax. This also helps in lengthening of the expiratory muscles which would improve the potential for greater recoil pressures leading to higher PEmax values. The upright seated posture would be advantageous during active expiration to help in contraction of the abdominal muscles, the rectus abdominis, internal and external oblique and transverse abdominis to increase the intra-abdominal pressure during active expiration[15]. This would explain the higher PImax values. Also, in addition when considering the rowing postures, in the 130^0 finish phase the respiratory muscle strength might be low as the respiratory muscles are used more for trunk stabilization than ventilation.

When comparing the ventilatory parameters between two groups after the 12-week exercise program, the experimental group showed slightly higher values compared to the control group although it was not significant. The novel RMT training program conducted in this study included profound (deep) inspirations and inspiratory hiccups which helped to strengthen the inspiratory muscles while isometric side bridge, curls ups improved expiratory muscles strength. In addition, it also included full-body stretch and lateral stretch techniques to stretch the chest wall. These techniques would have helped to strengthen the respiratory muscles, improve spirometry and increase chest expansion in the experimental group compared to the control group. These exercises have similarities with deep breathing techniques used in pranayama yoga practice during which the respiratory muscles are stretched fully towards the chest wall represented by increased chest wall expansion together with increased lung volumes, capacities and flow rates in healthy subjects[20] while long term benefits of yoga included increased chest expansion, breath-holding time and PEF.[21]

In the present study, it was observed that the respiratory functions do not significantly change in the different postures in the rowing ergometer machine. However, it was observed that the respiratory functions tended to be highest in the flexed and upright seated postures compared to the horizontal lying position (130^0). This study also suggested that novel RMT program had an effect in improving some respiratory functions including respiratory muscle strength in the experimental group in the 130^0 finish phase. Finally, this study further confirmed that RMT carried out in different postures cannot be recommended for respiratory muscle training for rowers.

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Reliability and Validity of Kannada Version of Tampa Scale of Kinesiophobia (TSK-KA-11) - A Validation Study

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Abstract

Background: Chronic widespread pain disorders prevalence has been reported to be 1%-15%. The global prevalence of MSDs ranges from 14% to as high as 42%. Fear of movement/(re)injury have been considered one of the most significant predictors of pain perpetuation and pain behavior, and is a central construct in the cognitive-behavioral model of Fear-Avoidance. One of the most widely used instruments to measure fear of movement or (re)injury during movement is TSK-11.

Objectives: To translate TSK-11 questionnaire into Kannada version. To find out test-retest reliability of TSK-11 in Kannada version among chronic musculoskeletal pain subjects. To find out construct validity of TSK 11 in Kannada version among chronic musculoskeletal pain subjects.

Methodology: Translation and cross-cultural adaptation of the original English versions of the TSK-11 was performed according to the published guidelines. The psychometric properties were evaluated by administering the questionnaire to 70 chronic musculoskeletal pain disorders patients. Test- retest reliability was estimated by internal consistency and test-retest assessment. Patients completed questionnaire twice with an interval of 1 week. Convergent construct validity was performed in relation to FABQ-KA.

Results: With respect to the chronic pain samples, the TSK-11 total score was significantly and positively correlated with catastrophizing, depression, anxiety, and pain intensity, and fear avoidance behavior of FABQ scores. Test-retest reliability was tested by using ICC (Baseline and post 1 week) internal consistency was reported in terms of Cronbach's α (0.89). Cronbach's α coefficient was calculated for item-scale correlation. It was calculated from first and second administration of TSK-KA-11(Level of significance was set up $P > 0.05$).

Conclusion: Results suggest that the TSK-KA-11 has been successfully translated and cross-culturally adapted from English to Kannada version and provides with the evidence that the TSK-KA-11 is a reliable and valid measure to assess 'Fear of re-injury' in Kannada-speaking chronic musculoskeletal pain disorder patients.

Keywords: TSK-KA-11; Chronic musculoskeletal pain disorders; Fear of re-injury; Reliability, Validity.

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Introduction

Musculoskeletal disorders (MSD) have been defined as one of the most common causes of severe long-term pain and physical disability which seems to affect hundreds to millions of people across the world[1] and are characterized by the presence of discomfort, disability, or persistent pain in the joint, muscles, tendons, and other soft tissues, caused or aggravated by repeated movement, and prolong faulty or forced body posture.[2] Chronic pain has been defined as pain that persists past normal healing time. Usually pain is regarded as chronic when it lasts or recurs for more than 3 to 6 months.[3]Chronic widespread pain disorders prevalence have been reported to be 1%-15%.[4] The global prevalence of MSDs ranges from 14% to as high as 42%.[5] The World Health Organization (WHO) estimates that 40% of people over the age of 60 years suffer from MSD.[5]

According to the 'fear avoidance' model of chronic pain, there are two extreme responses to pain-related fear: confrontation and avoidance.[6] Avoidance of activities causing more stress at the back maintains or aggravates the pain related fear while a reduction in the pain related fear is observed due to confrontation.[6] This model states that catastrophic thoughts about pain are associated with avoidance behaviors and hypervigilance to bodily sensations and pain.[6] Depression and disuse (state of inactivity) may be caused that further leads to decreased pain tolerance and therefore a painful experience.

A cognitive-behavioral oriented model for chronic pain has been proposed which is based on fear avoidance model.[6] Research has supported the relation between pain catastrophizing and pain-related fear, pain-related fear and disability, and between pain-related fear and increased body awareness and attentional focus toward pain and noxious body stimuli.[6] Empirical evidence supports the notion that the persistence of pain equally depends on these cognitive, behavioral, affective, and social factors.[7] Among these, fear of movement/(re)injury have been considered one of the most significant predictors of pain perpetuation and pain behavior, and is a central construct in the cognitive-behavioral model of Fear-Avoidance.[7] The Tampa Scale of Kinesiophobia (TSK) is one of the main instrument that is based on this model.[7]Back pain patients who exhibit higher levels of pain related fear report higher levels of pain, disability and performs less well on physical performances when compared to those having lower levels of pain related fear.[8]Also it has been observed that reduced level of pain related fear contributes to reduced level of disability.[8]

One of the most widely used instruments to measure fear of movement or fear of (re)injury during movement. It has been translated into 10 languages.[9] The TSK-11 is the most widely used; 17 it contains 11 items from the original 17-item questionnaire, with items 4, 8, 9,12,14 and 16 removed.[9] Each item is scored on a 4-point Likert scale, ranging from 1 'strongly disagree' to 4 'strongly agree'; total scores vary between 11 and 44, with higher scores indicating higher levels of fear of movement-related pain.[9] The TSK-11 groups items on two distinct factors: activity avoidance (e.g., 'I'm afraid that I might injure myself if I exercise'); and somatic focus (e.g., 'Pain always means I have injured my body').[9] The instrument is administered on paper or online, and takes 4 to 8 minutes to complete.[9]

Cronbach's alpha values of the TSK-11 range from 0.7 to 0.9, indicating acceptable to excellent internal consistency. Test-retest reliability is high (intraclass correlation coefficient > 0.7). Concurrent validity is also good, whilst construct, criterion, and predictive validity range from moderate to good. The TSK-11 exhibits extensive convergent validity with other tests. For instance, the authors reported cross-sectional convergent construct validity with the Pain Catastrophizing Scale23 (assessing cognitive-affective responses to anticipated/actual pain). Sensitivity and specificity for the TSK-11 are estimated to be 66 and 67%, respectively.[9] The authors developed age-based and gender-based normative scores, which are invariant across different pain diagnoses. Individual test scores can be compared to these normative scores to determine whether fear of movement related pain is within the normal range (1 SD), elevated (> 1 SD), or excessive (> 2 SD).[9]

Materials and Methods

This was a validation study conducted among the subjects with chronic musculoskeletal disorders

in Srinivas College of Physiotherapy and Research Centre OPD, various private Clinics in and around Karnataka during April 2019 to May 2020. This study was approved by the institutional ethical committee of Srinivas college of physiotherapy and Research centre and was also approved to get the access of patient records those were included in the study from other participating hospitals and all participants provided the informed consent.

The subjects included in the study were of both genders in the age group of 25-85 years suffering with chronic musculoskeletal disorders and were able to speak, read and write Kannada. The principal investigator is a qualified physiotherapist, currently pursuing master's degree at Srinivas College of Physiotherapy and Research Centre, Mangalore. Materials used were Data recording sheet- To record the data, English version of TSK-11, Kannada version of FABQ. The exclusion criteria includes Serious spinal pathology (Tumors), Nerve root pain, Cauda equina syndrome, Neurological disorders or inflammatory disorders , Spine Fracture, Unstable Angina and Cerebrovascular events. All participants were asked to sign written consent form stating the voluntary acceptance to participate in the study.

Cross cultural adaptation

The guidelines for cross-cultural adaptation of the TSK 11 will be subjective questionnaire, the TSK 11 will be cross-culturally adapted into Kannada version of TSK 11 in six steps: **Step 1:** Initial translation to Kannada language/ forward translation: The first stage in adaptation is the Initial translation. Initial translation of TSK 11 will be done into Kannada language from original English version of TSK 11. This step will be performed by two bilingual individuals whose native language is Kannada. One is the orthopedic surgeon and other is the physical therapist with extensive clinical experience in musculoskeletal disorders, to perform an initial translation from English to Kannada. **Step 2 Synthesis:** After discussion, the 2 translators produced a consensus version of the TSK-11.**Step 3 Back translation:**

Back translation of preliminary TSK 11 in to English will be conducted by two native English speakers who are fluent in Kannada. The two translators should neither be aware nor be informed of the concepts explored, and should preferably be without medical background. **Step 4 Reviewer's committee:** An expert committee, including forward and back translators and a health professional and a language professional will review all translations and develop the pre-final version of TSK 11 kannada version with emphasis on semantic, idiomatic, experimental and conceptual equivalence in relation to original back translated TSK 11 versions. **Step 5 Pre-testing:** According to inclusion and exclusion criteria the pre-final questionnaire will be administered to those who were diagnosed with chronic musculoskeletal pain. The interviewer will report on each respondent understanding the questionnaire items and making decision on them. As no further adaptation is indicated, the pre-final and final TSK 11 KA will be identical. The objective is to assess whether the translated questionnaire is understandable, the vocabulary is appropriate and also the expression is relevant for Kannada culture. **Step 6 Validation study:** Construct validity with FABQ will be obtained by the Experts and the translators. Reliability will be tested by internal consistency and test-retest reliability. For test-retest reliability questionnaire has to be given at first visit and after 1 week. So that person may not copy the same data as well as he/she will not forgot.

Results

Data were tabulated in Microsoft EXCEL computer software and were analyzed by using SPSS windows version (16). Study evaluated the test-retest reliability of TSK-KA-11 among 70 chronic pain musculoskeletal disorders patients and for validation construct validity was used. Descriptive statistics were done by finding the mean values of age, weight, height, BMI and the data resulted from TSK-KA-11 were provided. It is reported in Mean ± standard deviation (95% CI). Test-retest reliability was tested by using the ICC (Baseline and post 1 week) internal consistency was reported in terms of Cronbach's α(0.89). Cronbach's α coefficient was calculated for item-scale correlation. It was calculated from first and second administration of TSK-KA-11(Level of significance was set up $P > 0.05$).

The construct validity was assessed on 5-point Likert scale, where higher values indicated higher risk of having fear and those on lower having less risk for the same. With respect to the chronic pain samples, the TSK-11 total score was significantly and positively correlated with catastrophizing, depression, anxiety, and pain intensity, and fear avoidance behaviour of FABQ scores.

Table 1: Descriptive statistics for demographic characteristics of patients with chronic musculoskeletal pain disorder

Variables	Mean ± SD
Age	45.23 ± 13.48
Height	155.21 ± 14.54
Weight	61.13 ± 13.05
BMI	27.32 ± 5.61

Table 2: Gender distribution

Gender	Frequency
Male	39
Female	31

Table 3: TSK-KA 11 scores at baseline and after 1 week

	Baseline (mean ± SD)	Retest (mean ± SD)
TSK-KA 11	35.23 ± 5.89	29.43 ± 8.25

Table 4: Cronbach's α

Internal consistency in terms of Cronbach's α for item scale correlation

Content	Cronbach's alpha
TSK-KA 11	0.895

Table 4 shows excellent correlation (Cronbach's alpha= 0.895)

Table 5: Test-Retest Reliability of TSK- K11 in Kannada Version

Inter-class Correlation Coefficient

	ICC	P- value
TSK-KA 11	0.075	0.567

Discussion

This study aimed to cross culturally adapt the Kannada version of TSK-11 and to test the psychometric properties of the Kannada version of TSK-11 in 90 subjects with chronic musculoskeletal pain disorders.

In this study 70 patients who fulfilled the inclusion criteria were participated. TSK-11 questionnaire was given at the first visit with 1week interval to measure the test-retest reliability and to measure validity. The results of the study showed good correlation ICC=0.07, $p<0.5$ indicating it is statistically significant and applicable to generalize to the broader population of interest and internal consistency (Cronbach's alpha=0.89) indicating better internal consistency.

In the Italian version of the TSK in subacute/ chronic LBP, the internal consistency of the TSK-I was acceptable: Cronbach's α was 0.772 for the total score, and slightly lower for the subscales. The test-retest reliability of TSK-I assessed on day 1 and day 7 was characterized by a highly significant correlation (ICC_0.956, 95% CI), with each item showing satisfactory ICCs ranging from 0.863 to 0.980. Also, it showed good psychometric properties, such as internal consistency, test-retest stability and discriminant validity.[10]

In the Portuguese version of TSK, it showed low to moderate levels of responsiveness on assessment of the TSK-PT three months after the first application.[14]

The Chinese version of SC-TSK, demonstrated good internal consistency, test retest reliability, and construct validity with Cronbach's α between 0.70 and 0.95 (i.e. excellent) and ICC value more than 0.70 (excellent reliability).[12]

In the Spanish version of the TSK-11 global score was significantly correlated with fear of movement as measured by that instrument, the association was quite low (r = .23), suggesting that they are measuring different constructs.[7]

It was found that TSK-KA-11 item showed test re-test reliability showed good ICC (r =0.07), $p > 0.00$ i.e. statistically significant. The internal consistency (Cronbach's α = 0.89) i.e. excellent correlation.

The construct validity between FABQ-KA and TSK-KA-11 showed that FABQ-KA was measuring more of the fear related to pain whereas TSK-KA-11 showed fear that is related to re injury and re occurrence of similar pain.

The TSK-KA-11 is a simple self -report questionnaire and takes 4 to 8 minutes to complete. The result showed that it was possible to translate this functional status questionnaire into other languages without losing psychometric properties of the original English version.

Limitations of the study

TSK-KA-11 makes no clear differentiation between pain and harm expectancies. Due to this contamination of harm/pain expectancies, the TSK-11 may be less suitable to determine whether exposure treatment is recommended. Also, since there is no gold standard value for assessing the fear in Kannada version of any questionnaire, it is impossible to measure the criterion validity until then.

Conclusion

Our results suggest that the TSK-KA-11 has been successfully translated and cross-culturally adapted from English to Kannada version. This study provides us with the evidence that the TSK-KA-11 is a reliable and valid measure to assess 'Fear of re-injury' in Kannada-speaking chronic musculoskeletal pain disorder patients. Thus, it can be used for assessing the risk of disability due to fear of re-injury in Kannada-speaking patients with chronic musculoskeletal pain disorders for both clinical and scientific purposes.

Ethical clearance taken from institutional ethical committee of Srinivas College of Physiotherapy and Research Centre, Mangalore

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Original Article

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Correlation Between Anthropometric Measures and Daytime Sleepiness in Young Adults

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Abstract

Background: Current patterns of lifestyle, especially in young adults, linked to technological and social development, have led to an increased prevalence of sleep disorders. Excessive daytime sleepiness (EDS) when present hampers the quality of life of the individual and the overall productivity of the community as a whole. Three major hormones which influence the metabolism of the human body namely ghrelin, leptin and insulin are known to be affected by Inadequate sleep. The purpose of this study was to find if there is any correlation between Excessive daytime sleepiness and body composition in order that useful interventions may be found, to reduce the burden of these conditions.

Methods: The research involved 30 subjects between 18 to 25 years of age. Body mass index, waist-hip ratio and neck circumference was calculated and the daytime sleepiness was measured using the Stanford Sleepiness Scale (SSS). The Spearman rank correlation test was used for analysis.

Conclusion: Stanford Sleepiness Scale score was correlated with Body mass index, waist-hip ratio and neck circumference individually and the p value came to be 0.5876, 0.8145 and 0.9076 respectively which is not considered significant. Hence, no correlation was found between daytime sleepiness and Body mass index, Waist-hip ratio and Neck circumference.

Keywords: Correlation; Anthropometric measures; Daytime sleepiness; Young adults.

Introduction

Excessive daytime sleepiness (EDS) is characterized by persistent sleepiness and a general lack of energy during the day after apparently adequate or even prolonged nighttime sleep. Studies show that healthy, normal young adults, particularly college students, are sleepier than healthy, normal older adults.[1,2] The cause of the increased sleepiness among younger adults has not been definitively demonstrated. Although, not sleeping enough could

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be one of the major factors.[1,2,3] Three major hormones which influence the metabolism of the human body namely ghrelin, leptin and insulin are known to be affected by inadequate sleep.[4] Excessive Daytime Sleepiness (EDS) when present, especially in young adults hampers with the daily life of an individual and have been known to be associated with serious consequences.[5]

The Stanford Sleepiness Scale (SSS), is validated and one of the most commonly used scales to measure daytime sleepiness.[6,7] It is a one-item self-report questionnaire measuring levels of daytime sleepiness. The scale, which can be administered in 1–2 minutes, is generally used to track overall alertness/drowsiness during the day and is most effective in assessing daytime sleepiness in adults aged 18 years and above.

Body measurements namely height, weight, body mass index (BMI), body circumferences (waist, hip, and limbs), and neck circumferences are quantitative in nature and are universally used to assess body composition. Current patterns of lifestyle, transformed cultural habits, introduction of new technologies had resulted into life being more sedentary, especially in young adults. Obesity has always been proposed to affect sleep architecture via a combination of impairment to physiological mechanisms.[8]

This study aimed to find if there is any correlation between excessive daytime sleepiness and body composition so that useful interventions may be found, to reduce the burden of these conditions and increase the overall productivity and quality of life of young communities.

Methods

A cross-sectional study was conducted in the physiotherapy OPD of a Tertiary Care Hospital in Mumbai across a duration of 6 months. Young adults aged from 18 to 25 years were selected by convenient sampling and a total of 30 subjects participated in the study. A small sample size was selected as this is a pilot study. Young adults, irrespective of their gender and with no major psychological and systemic disorders and those not on any physical fitness program were eligible to participate in this study.

The Stanford sleepiness Scale was used to assess Daytime sleepiness. It consisted of a seven-point rating scale with a maximum score of 7 corresponding to highest sleepiness level and a minimum score of 1 corresponding to lowest level of sleepiness.The subject was asked to rate his/her current sleepiness state and the score corresponding tothe sleepiness level was noted as the Stanford sleepiness scale score.

Assessment of anthropometric measures namely body mass index, waist hip ratio and neck circumference were done.

For measuring the Body Mass Index, the weight (in kgs) of the subject was measured using a weighing scale and the height (in meters) of the subject was determined using a tape measure. The weight was then divided by the square of the height, and the resultant score was noted as the Body Mass Index. Body Mass Index of more than 22.9 was considered as the cut off for overweight and obesity.[9]

Waist Hip Ratio was calculated by dividing the waist circumference by the hip circumference Measurements were taken with the help of a tape measure. The waist circumference was taken at the level of the smallest circumference, usually just above the belly button, and circled the whole way around the body and back to the starting point. The hip measurement was taken as the largest circumference around the buttocks. Waist Hip Ratio of more than 0.88 in males and more than 0.81 in females was considered as the cutoff for overweight/ obesity.[9]

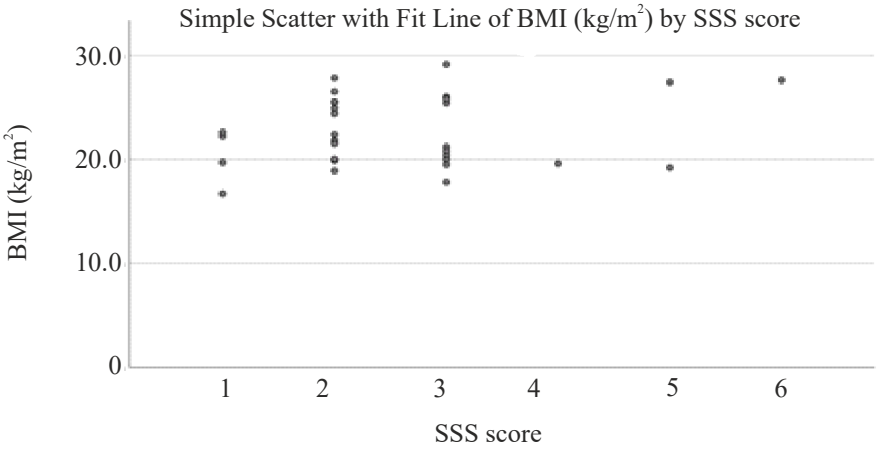
The Neck Circumference was measured using a tape measure taken at the level of the mid-neck, between the mid cervical spine and the mid anterior neck. In men with a laryngeal prominence (Adam's apple), measurement was taken just below the prominence. Neck circumference of more than 35.5 cms in males and more than 32 cms in females was considered as the cutoff for overweight/ obesity.[10]

The data was analyzed using Statistical Package for the Social Sciences (SPSS) version 26. Descriptive statistics including frequency, percentage, mean and standard deviation was used to analyze the study population. Spearman's Rank Correlation Coefficient Test was used to study the relationships between the variables. Differences were considered significant at $p< 0.05$

Results And Discussion

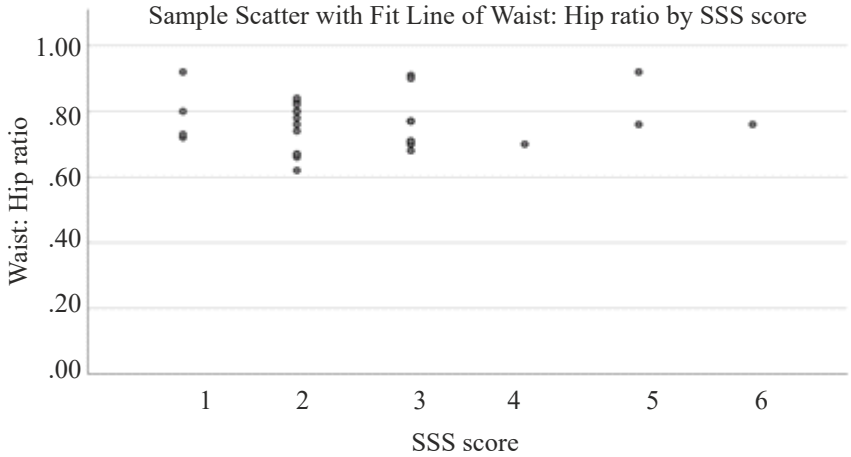
Table 1: Distribution of Stanford Sleepiness Scale(SSS) Scoreand Body Mass Index (BMI), Waist-Hip Ratio (Whr), Neck Circumference (NC).

	Frequency (n)					
	Normal BMI	Increased BMI	Normal WHR	Increased WHR	Normal NC	Increased NC
SSS score ≤ 4	17	10	21	6	11	16
SSS score ≥ 5	1	2	2	1	1	2



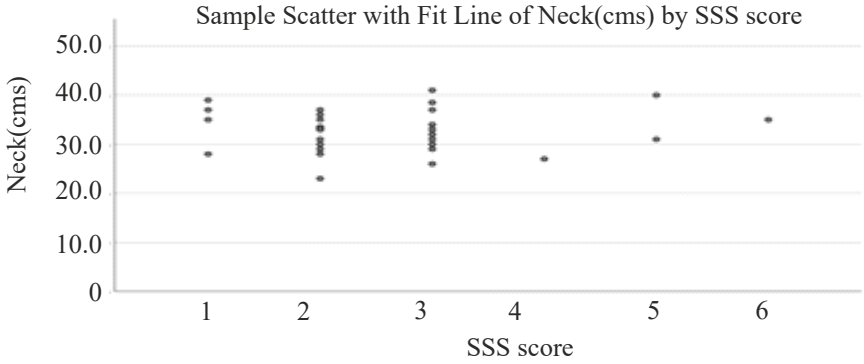
Graph 1: Correlation Between Stanford Sleepiness Score (SSS) and Body Mass Index (BMI)

According to Spearman Correlation coefficient test, the p value is 0.5876 considered not significant which indicates that there is no correlation between SSS Score and BMI. The rho value is 0.1031.



Graph 2: Correlation Between Stanford Sleepiness Score (SSS) And Waist-Hip Ratio (WHR)

According to Spearman Correlation coefficient test, the p value is 0.8145, considered not significant which indicates that there is no correlation between SSS Score and WHR. The r value is -0.0447.



Graph 3: Correlation Between Stanford Sleepiness Score (SSS) and Neck Circumference (NC)

According to Spearman Correlation coefficient test, the p value is 0.9076, considered not significant which indicates that there is no correlation between SSS Score and NC. The r value is -0.0221.

The ever-increasing cases of daytime sleepiness among young population has been shown to affect the daily life of the individual as it reduces the productivity. This is caused due to lack of alertness during the day when most tasks are to be carried out. Moreover, in recent times with almost all activities becoming mechanized, has led to the increasing adaptation to sedentary lifestyle. The goal of this study was to find correlation between Anthropometric Measures (BMI, WHR, NC) and Daytime Sleepiness. The analysis was done using Spearman's correlation coefficient test.

A total of 30 subjects were selected to participate in the study. Their age ranged from 18 years to 24 years with mean age of 20.90 ± 0.316 years [Table 1]. This included 21 female participants and 9 male participants [Table 2]. Of these, 2 participants were underweight, 16 had normal Body Mass Index, 2 were overweight and 10 belonged to the obese category with a mean value of 22.67 ± 0.6163 [Table 3]. A total of 25 subject had normal Waist -Hip Ratio and 5 had increased Waist-Hip Ratio with a mean value of 0.7640 ± 0.0145 [Table 4]. 14 subjects had normal Neck Circumference whereas 16 subjects had increased Neck Circumference with a mean value of 32.85 ± 0.7930 [Table 5]. The Stanford Sleepiness Scale Score ranged from 1 to 6 with 27 subjects scoring 4 and lower and only 3 subjects scoring 5 and higher with a mean value of 2.60 ± 0.218 [Table 6]. Table 7, Table 8 and Table 9 shows the correlation between Stanford Sleepiness Scale Score with Body Mass Index, Waist-Hip Ratio and Neck Circumference respectively.

Previous studies done for finding out the association between obesity and daytime sleepiness have shown positive result which is not in accordance with the results of our study.

A study done by Maugeri *et al* showed that indices of obesity was indirectly proportional to the duration of sleep. Body mass index, waist hip ratio and body fat were taken into consideration and they all showed increased measures in subjects with decreased sleep duration. The prevalence of central obesity was also lower in long sleepers. The study also concluded that subjects with excessive daytime sleepiness had a higher Body mass index and waist hip ratio.[3]

One specific study done by Vgontzas *et. al.* on subjects ranging from age 17 to 58 years concluded that obese subjects without sleep apnea were much more sleepier during the day as compared to subjects with normal weight.[15]

Another study done by Resta *et. al.* on obese as well as non-obese subjects also showed similar results to the study done by Vgontzas.[11]

However, all of these studies have been done on a wide age group range and no study has been done specifically for younger adults in the Indian population. Our study specifically targets the young Indian population as obesity and daytime sleepiness are being constantly reported to be on the rise.

Conclusion

The results of this study show that there is no correlation between Anthropometric Measures and Daytime Sleepiness in young adults.

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Original Study

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Effect of Pain Education on Quality of Life of Chronic Low Back Pain Patients

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Abstract

Background: Chronic low back pain is a very common symptom in populations everywhere and is responsible for more years lived with disability world wide than any other condition. It is a main cause of activity limitation and work absence, moreover, reduced mobility can lead to significant alterations inquality of life in the longterm.

Objective: To find out the effect of pain education on Quality of life of chronic low back pain patients.

Methodology: Forth is study 40 subjects with chroniclow backpain who fulfill these lection criteria were recruited. Subjects have been divided into 2 groups based on simple random sampling (Lottery Method). Group A (Experimental Group) received pain education along with conventional exercises. Group B (Control Group) received only conventional exercises.Both groups received intervention for about 4 weeks with each session 45 minutes.

Result: Participantsin both groups experienced reduction in pain,fear, disability and improvement in Quality of life.

Conclusion: The results of this study concluded that there was no significant difference between pain education group and conventional exercise group.

Keywords: Chronic Low Back Pain; Fear avoidance and belief questionnaire; Numerical pain rating scale; Oswestry Disability Index; Pain education.

Introduction

Chronic pain is defined as "An unpleasant sensory and emotional experience associated with or resembling that related to actual or potential tissue damage." (IASP 2020). Chronic low back pain is also a very common complaint among the general population, and it is responsible for more years of disability than any other condition in the globe.[1,2] Limited physical activity is one of the most important variables that contribute to a chronic musculoskeletal pain condition, because it ends up in reduced mobility and may cause major changes in health status and thus quality of life in the long run.[3]

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Low back pain prevalence was found to range from 6.2% to 92% with an increase prevalence with age and feminine preponderance and most subjects (90.6%) were aged 20-29 years (mean, 24.49: range, 18-35 years), with an incidence, that's highest within the third decade of life.[4] (Dasgupta 2016)

Low back pain classified into 3 types. Acute low back pain which lasts but 6 weeks, Sub-acute low back pain which lasts between 6-12weeks, Chronic low back pain which lasts over 12 weeks.[4,5] The negative cognitive-emotional response to pain known as pain catastrophizing, which includes rumination, amplification, and helplessness, has been linked to pain severity, disability, and poor outcomes in individuals with chronic low back pain.[6] (David S Butler).

According to the Biomedical paradigm, it focuses on physical processes that affect health, such as biochemistry, physiology, and pathology of an illness. It neglects to account for social or psychological factors that may have a role in the disease. According to this paradigm, each ailment has a single underlying cause, and if that cause is addressed, the patient will be restored tohealth.[7]

CLBP's bio psychosocial paradigm acknowledges that cognitive, emotional, psychological, behavioral, physical, and social components all interact to perpetuate pain, and that these factors can all be treated with integrated multimodal therapy. Since no single model has been shown to be superior to the others, it is advised that the most effective way to employ these models is to use the right components of each in accordance with the unique needs of individual patients rather than to follow one specific model.[8,9]

Ryan and colleagues discovered that people with CLBP had lower levels of physical activity than their matched controls in a study of 15 adults with chronic low back pain (CLBP) in Glasgow, Scotland.[10, 11] This fear- avoidance behavior results in reduced levels of physical activity and physical fitness and contributes to increasing levels of disability in people with chronic pain [12, 13](Giordano2020).

Pain education has become a popular educational intervention for people with chronic pain who wish to improve their ability to self-manage. It is based on a cognitive behavioral approach that supports pain self-efficacy.[14]

Methods

Research Design: Randomized control Trail, with two parallel group of allocation ratio 1:1

Participants

Inclusion Criteria: Middle age from 25-45 years, Both Men and Women, Numerical Pain Rating Scale 4-7, Pain which lasts more than 12 weeks.

Exclusion Criteria: Spinal Stenosis Malignancy, Pregnancy induced low back pain, Fracture induced low back pain, Any histories of surgeries in past 2 months, CNS impairment, Cardiovascular, Renal Impairment, Subjects with poor mental retardation or cognition.

Sampling: Simple random sampling method.

Blinding: Evaluation with respect to result degree was conducted by assessor blind to exercise allocation evaluation with respect to result degree was conducted by assessor dazzle to work out assignment.

Study duration: 4 weeks

Study setting: Hospitals

Sample size: 40

Experimental procedure:

Informed consent was taken from 40 subjects who fulfilled the inclusion and exclusion criteria. Pre intervention detailed assessment was taken. Later the subjects were randomly allocated using simple randomization method for experimental group and conventional exercise group with 20 subjects in each group.

Procedure for Group A:

(Experimental Group) Pain education and conventional exercise:

The intervention consists of pain education and conventional exercises. The pain education session was delivered in a group setting of 20 Subjects. The intervention was delivered by physiotherapist, pain

education session was based on the manual 'Explain Pain'- Pain Adaptive Behaviour.

Step 1: Patient fulfilling eligibility criteria will be recruited & allocated to groups

Step 2: Collect history

Step 3: Assess pain, disability & QOL outcome measures using

- Numerical pain rating scale
- Oswestry low back pain questionnaire
- Fear avoidance beliefs questionnaire
- Quality of life questionnaire sf-36(QOL)

Step 4: Pain education session (pain adaptive behavior)

Pain biology:

Pain physiological and biological mechanism was discussed and explained to the subjects in a narrative way as described by David Butler in Explain Pain Manual using aBooklet

Pain coping strategies:

Active coping strategies:

learning about the problem: Talking about a stressful event with a supportive person can be an effective way to manage stress. Seeking external support instead of self-isolating and internalizing the effects of stress can greatly reduce the negative effects of a difficultsituation.

Exploring ways to improve: Relaxation techniques can help ease muscle tension, muscle spasm, aches and pain. They can release endorphins, which are the body's natural painkillers. Deep Breathing techniques.

Exploring and nudging the edges ofproblem-Staying Positive-Life is constantly throwing unexpected challenges at us changing your perspective on how you see things. Making plans -making a schedule, planning your tasks, Leaving space between schedules.

Passive coping strategies:

Avoiding activity

Doing nothing and waitingfor something to happen

Increase in physical activity

Procedure for Group B

(Control Group) conventional exercise:

Four-point kneeling: Shoulders set down in neutral, tilt the pelvis into anterior and posterior tilt then find the neutral, draw in lower abdominal to engage your core. This exercise aims to strengthen the hip, pelvis, shoulder and neck.

Single leg extension from 4-pointk neeling: Leading with the heel, lift one legup behind you, keeping your knee at 90 degrees. Think about pushing the sole of your elevated foot up towards the ceiling. Extend as far as able without arching theback.

Alternate arm and leg lifts from 4-point kneeling.: From the 4-point kneeling position alternate arm and legs are lifted off the mat. Lift right arm and left leg slowly off the floor and extent them straight out, so that leg, back and arm are roughly in one line.

Upper and oblique abdominals: From lying positions with knee straight then bending the knee the patient to come up from mat. Engage your core and raise your hip until your body is in straight line from head to toe.

Knee to chest: Lie on your back with your knees bent and your feet flat on the floor. Bring one knee to the chest, keeping the other foot flat on the floor then relax and lower the knee to the starting position.

Arm lifts: Lie on your stomach on a mat. Stretch out arms over head and slightly out to the side lift one arm with your hand positioned so that thumbs point upwards. Then relax slowly lower your arm then raise the other arm in the same manner.

Bridging. The patient lies down on the back, knees in full flexion and feet flat on the floor and close to the buttock. Then the patient lifts off the floor towards the ceiling.

Conventional exercise group performed the exercises 45 minutes per day for a period of 5 days a week for 4 weeks

Statistical Analysis:

Baseline demographic and clinical characteristics was analyzed using mean and standard deviation.

In this study the Wilcoxon signed rank test, Mann Whitney U test were used as a statistical tool for detecting the significant difference within and between the group A (experimental group) and Group B (control group).

Table 1: Baseline Characteristics of Study Participants:

SI. No	Variable	Group A (PE+CE) *	Group B (CE)*	P value (<0.05)
1	Age (mean±S.D)	35.15±4.39	35.10±4.17	0.362
2	Gender			
	Male	9	11	0.34
	Female	12	8	

*Abbreviation used: PE +CE -Pain Education and conventional Exercise, CE-Conventional Exercise.Data are mean ± standard deviation (Sd). In summary data were homogenous among both groups

Table 2: Comparison of Group A (pain education and conventional Exercise) versus Group B (conventional exercise group) using Mann Whitney U test.

S. No	Variable	Group A Pre-Test Mean ±S. D	Post Test	Group B Pre-Test Mean ±S. D	Post Test	P value (<0.05)
1.	NPRS	6.2 ± 0.83	5.3±0.80	6.3±0.73	5.25±0.78	0.726
2.	FABQ	59.05±4.98	56.2±5.31	59.25±4.95	56.2±5.31	0.002
3.	ODI	25.75±5.84	22.85±5.89	25.9±6.55	24.3±6.10	0.010
4.	QOL	53.85±3.03	54.8±3.45	56.05±2.95	57.15±3.03	0.039

*Abbreviations used: NPRS-Numerical Pain rating Scale, FABQ-Fear avoidance and Belief Questionnaire, ODI-Oswestry Disability Index, QOL-Quality of Life. The table above depicts the pre-test and post-test differences between Group A and Group B, indicating that NPRS values were not statistically significant, while FABQ, ODI, and QOL were.

Table 3: Comparison between change of scores within Group A (pain education and conventional exercise group)

S. No	Variable	Pre-test	Post-test	Difference	p-value (<0.05)
1.	NPRS	6.26±0.83	5.00±0.80	1.26	0.0009
2.	FABQ	59.05±4.98	56.2±5.31	2.85	0.0021
3.	ODI	25.75±5.84	22.85±5.89	2.90	0.0008
4.	QOL	53.85±3.03	57.05±3.45	3.2	0.0008

The above Table 3 shows pretest and post test difference value for Group A (Pain education and conventional Exercise group) Wilcoxon signed rank test was used to determine statistical significance, and it was found to be significant.

Table 4: Comparison between change of scores within Group B (conventional exercise group)

S. No	Variable	Pre test	Post test	Difference	p-value (<0.05)
1.	NPRS	6.30±0.73	5.25±0.78	0.75	0.0004
2.	FABQ	59.25±4.95	57.5±4.90	1.75	0.0004
3.	ODI	25.9±6.55	24.3±6.10	1.6	0.0044
4.	QOL	53.07±2.96	55.00±2.78	1.30	0.0042

The above Table 4 shows pretest and post test difference value for Group B (conventional Exercise group) Wilcoxon signed rank test was used to determine statistical significance, and it was found to be significant.

Table 5: Effect Size of values of Group A (pain Education Group) and Group B (conventional Exercise Group).

S. No	Variables	Group A Mean±S.D	Group B Mean±S.D	Cohens d Effect size
1.	NPRS	5.30±0.80	5.25±0.78	0.063 0.031(S)
2.	FABQ	56.2±5.31	57.5±4.90	0.25 0.12(S)
3.	ODI	22.85±5.89	24.3±6.10	0.24 0.12(S)
4.	QOL	57.05±3.45	55.00±2.78	0.65 0.31(M)

It was estimated the difference between the NPRS, FABQ, ODI, and QOL findings. With a small effect size, NPRS values showed reduced discomfort. With a modest effect size, FABQ values showed decreased fear, ODI values showed reduced disability, and QOL values showed enhanced function with a small-medium effect size.

Results

Participants in both group experienced reductionin pain with small effect size. Participants in pain education group experienced significant reduction of fear the effect size was small, reduction indisability the effect size was small, and improvement in Quality of life the effect size was small-moderate.

Discussion

The aim of this study was to find out the effectiveness of pain education on quality of life of chronic low back pain patients. The study results were interpreted based on the outcome measuresused.

Changes in Numerical Pain Rating Scale between Pain Education Group and conventional exercise Group

The result of the present study showed improvement in Numerical Pain Rating scale in both pain education group and conventional exercise group the mean difference between both groups was not statistically significant. As a result, null hypothesis will be accepted.

In a randomized control trial to assess the effect of pain education for patients with chronic low back pain, **Gema Bodes Pardo et. al.** found a large change in pain intensity (numerical pain rating scale -2.93 to -1.28 in the pain education group) at 3 months, whereas **Tegner Heidi et. al.** found only a small efficacy in chronic low back pain patients.

Changes in Fear Avoidance and Belief among pain education and conventional exercise group:

In comparison to the typical exercise group, the pain education group exhibited a decrease in fear and catastrophizing of pain. The pain education outcomes have demonstrated that it is more effective than usual in reducing fear and incapacity. Therefore, null hypothesis is rejected.

According to **Clare Creswell**, fear avoidance and pain catastrophizing were detected in 25.5percent and 15.1 percent of CLBP patients, respectively. A lesser degreeof education was also linked to pain catastrophizing and fear, according to the researchers.

Reason for improvement of Quality of life:

Physical therapists frequently employ anatomy and pathoanatomic-based models to explain pain to their patients, According to **Weiner BK et. al**. These models have not only demonstrated minimal success in reducing pain and disability, but they may also raise patients' fear, which may aggravate theirdiscomfort.

Because the patient is active compared to a more passive education attempt, the employment of booklets has been used as valuable aids in improving information retention compared to verbal communication. Which would likely aid patient in the development of much needed deep learning processes. Patients may perceive themselves as less impaired and hence be more motivated to raise their activity levels.

Conclusion

According to the findings of this study, there was no statistically significant difference between the pain education group and the conventional exercise group, showing that both groups are equally helpful in lowering pain, fear, disability, and improving quality of life.

Limitation:

The functional gain did not last, implying that future intervention development should focus on durability. In addition, a one-month follow-up of participants in this study may not be sufficient. Indeed, a longer-term follow-up duration of greater than 6 months could help in this regard.

Conflict of Interest: None

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Ethical Clearance: It was obtained from ethical committee of Oxford College of Physiotherapy.

Disclaimer: The findings of this study are based solely on subject experimentation.

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Original study

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Effect of Foot Intrinsic and Tibialis Posterior Muscle Training on Dynamic Balance in Bharatanatyam Dancers a Comparative Study

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Abstract

Background: Dancers require good body balance to maintain and continuously change the postures. Due to repetitive foot tapping, changes are seen in the medial longitudinal arch causing flat foot in Bharatanatyam dancers which affects their balance and overall performance while dancing. Strengthening extrinsic and intrinsic muscles is more effective interventions for flexible flat foot. Although foot muscle exercises for the height of MLA have been limited to intrinsic foot muscle strengthening without considering extrinsic foot muscle. Exercise interventions that comparing foot intrinsic muscle and extrinsic muscle are rare and studies of dynamic balance in relation to the pes planus in Bharatanatyam dancers are lacking. Therefore, the present study includes a comparison of the effects of foot intrinsic and tibialis posterior muscle training, in relation with foot arch height, dynamic balance, and performance in Bharatanatyam dancers with flexible flat foot.

Objective: To compare the effects of foot intrinsic muscle and tibialis posterior muscle training on dynamic balance in Bharatanatyam dancers.

Method: 30 flexible pes planus Bharatanatyam dancers were recruited and were randomized into two groups. Group A performed foot intrinsic muscle training and group B performed tibialis posterior muscle training. All groups received strength training for 30 minutes five times a week for six weeks

Results & Discussion: Statistical analysis was done using pared t test for intragroup significance and independent t test for intergroup significance. Results obtained revealed that both groups showed significant difference between their pre-test and post-test values($p \geq 0.05$).

However intergroup analysis showed no significant difference ($p \leq 0.05$) between group A (Foot intrinsic muscle training) and group B (Tibialis posterior muscle training) in SEBT, FPI 6 and DFOS.

Conclusion: Tibialis posterior muscle strengthening group is equally effective as foot intrinsic muscle strengthening in terms of foot posture, dynamic balance and Dance function.

Keywords: "Bharatanatyam dancers"; "Tibialis posterior"; "Dynamic balance".

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Introduction

Bharatanatyam is an Indian classical dance form which involves continuously changing postures, to attain which dancers need optimum muscle strength, RoM and dynamic balance.[1]

Balance is also a necessary component of daily living activities and sports.[2] Dynamic balance is the ability to maintain stability of CoM during movements. The process of maintaining balance is complex and involves co-ordination of sensory, motor and biomechanical components.[1]

The feet of Bharatanatyam dancers are constantly exposed to high impact forces and the incidence of flat foot is 75%. Foot arch Flattening causes postural instability and balance problems in healthy population, which reduces overall performance in dancers.[3-5]

Among the conservative treatments, foot muscle exercises can reduce excessive pronation, improve foot muscle strength, functions and restructure the foot and being simple to perform.[6]

Foot muscles are subdivided into intrinsic and extrinsic muscles. Intrinsic foot muscles comprise four layers of small muscles, which include Abductors halluces, Flexor digitorum brevis, Abductor digiti minimi, and Quadratus plantae. It primarily stabilizes the arch and assist standing postures, dynamic balance and support the MLA during push-off in the stance phase.[7,8] Toe curls and short foot exercises are most commonly recommended for intrinsic muscle strengthening.[9–12]

Extrinsic foot muscles especially Tibialis posterior muscle which maintains foot supination for the longest time, maintains MLA during dynamic weight bearing and balance. Provides foot adduction, supination, plantar flexion and assists in controlled flattening of MLA through eccentric contractions during stance phase of gait cycle.[7] Foot adduction and supination being most effective for selective strengthening of tibialis posterior muscle.[13]

Foot muscle exercise interventions for flatfoot treatment have been limited to intrinsic foot muscle strengthening without considering extrinsic foot muscles.[14] Traditional practices of dancers need to be carefully studied and juxtaposed with the modern system of physical training to provide scientific recommendations to prevent injuries and offer right treatment. The present study examines the effects of strengthening tibialis posterior muscle, as well as intrinsic foot muscles related to foot arch height, dynamic balance and dance functions in Bharatanatyam dancers.[15]

Methodology

Study settings: Chithambaram Kalaakshethram, Iritty, Kannur, Kerala, India

Sample size: 30

Inclusion criteria

- Both male and female subjects.
- 15 to 20 years of age
- > 3 years of Bharatanatyam training, formal training for ≥ 6 months, and currently practicing for ≥ 6 hours a week.
- FPI 6 score ≥ +6

Study procedure

30 Bharatanatyam students (group A-15 subjects, group B-15 subjects) fulfilling the inclusion criteria were included in study. Informed consent was obtained and pre-evaluation of foot posture, dynamic balance and dance functions have done using FPI-6, SEBT and DFOS respectively. A brief demonstration about the procedure was given. Both groups received strength training for 30 minutes, five times a week, for six weeks.

Group A: Intrinsic Muscle Strengthening Exercises

1. Short Foot Exercise

Sit with good posture in sturdy chair, with feet on the floor, toes facing straight forward and the knees 90° bend. Inhale and contract the muscles on bottom of the foot and lower legs, to raise the foot arch without curling toes. Hold for 6 seconds.

2. Towel Curl Exercises

Place towel under foot, flat. Sit with heels under the knees. Feet parallel to each other with toes pointing forward. Heels should stay in place on towel. Pull the towel towards the heel.

Group B: Tibialis Posterior Muscle Strengthening Exercises

1. Foot Adduction Resistance Exercise

Sit with feet on floor, forearm length apart and knees bent to 80°. For leg stability, place forearms on opposite sides of leg. providing Elastic bands depending on subject's muscle strength, which were wound around medial and lateral sides of foot, tied up, and pulled laterally at an angle of 45° to the floor. Feet should be flat, in contact with the floor, and move as they sweeping the floor.

2. Foot Supination Resistance Exercise

Place one leg on and stand at the lateral end of footboard with knee joint of limb which placed on the footboard maintaining a bend. Subject placed medial part of heel and foot at the base of 3rd metatarsal bone on the edge of footboard to perform foot supination.

FINDINGS

SEBT

- **Anterior**

In group A, mean difference of pre and post-test mean scores of left feet was 1.87. Paired 't' test value of t=4.525 found to be statistically significant at p<0.001. Mean difference in right foot was 2.60 and paired 't' test value of t=6.703 found to be statistically significant at p<0.001.

In group B, mean difference of pre and post-test mean score in left foot was 2.06. Paired 't' test value of t=6.546 was statistically significant at p<0.001. Mean difference in right foot was 1.73 and paired 't' test value of t=3.591 found to be statistically significant at p<0.01.

Independent 't' test values was not statistically significant at p < 0.05 level. There is an equal and significant improvement in dynamic balance (left and right foot- anterior) in both groups

- **Postero-medial**

In group A, mean difference of pre and post-test mean score in left foot was 1.93. Paired 't' test value of t=6.808 found to be statistically significant at p<0.001. Mean difference score of pre and post-test mean score in right foot was 2.13. Calculated paired 't' test value of t=5.870 found to be statistically significant at p<0.001.

In group B, mean difference of pre and post-test mean score in left foot was 2.53. Paired 't' test value of t=8.264 was statistically significant at p<0.001. Mean difference score of pre and post-test mean score in right foot was 2.0. Paired 't' test value of t=7.746 was found to be statistically significant at p<0.001.

Independent 't' test values was not found to be statistically significant at p < 0.05 level. This clearly infers that there is an equal and significant improvement in dynamic balance (left and right foot-postero medial) in both groups

- **Postero-lateral**

In group A, mean difference of pre and post-test mean score in left foot was 2.40. Paired 't' test value of t=9.431 was found to be statistically significant at p<0.001. Mean difference in right foot was 2.13. Paired 't' test value of t=6.346 was found to be statistically significant at p<0.001

In group B, mean difference of pre and post-test mean score in left foot was 2.20. Calculated paired 't' test value of t=6.454 was statistically significant at p<0.001. mean difference in right foot was 1.80. The calculated paired 't' test value of t=5.511 was found to be statistically significant at p<0.001.

Independent 't' test values were not found to be statistically significant at p < 0.05 level. This clearly infers that there is an equal and significant improvement in dynamic balance (left and right foot-postero lateral) in both groups.

FPI 6

In group A, mean difference of pre and post-test mean score in FPI 6 was 1.13. Paired 't' test value of t=8.500 was statistically significant at p<0.001.

In group B, mean difference of pre and post-test mean score in FPI 6 was 0.93. Paired 't' test value of t=6.089 was statistically significant at p<0.001.

Independent 't' test values was not statistically significant at p< 0.05 level. This clearly infers that there is an equal and significant improvement in foot posture in both groups.

DFOS

In group A, mean difference of pre and post-test mean score in DFOS was 0.87. Paired 't' test value of t=2.827 was statistically significant at p<0.05.

In group B, mean difference of pre and post-test mean score in DFOS was 1.20. Paired 't' test value of t=4.294 was statistically significant at p≤0.001.

Independent 't' test values was not statistically significant at p < 0.05 level. Clearly infers that there is equal and significant improvement in foot posture of both groups.

Discussion

The feet of Bharatanatyam dancers are constantly exposed to high impact forces and are more susceptible to postural deviations, instability and injuries which reduces overall performance in dancers. Previous studies recommend that the dancers should be well trained about foot problems and their prevention. Bharatanatyam dancers should be formulated a treatment-based program according to their lifestyle and profession.

Flexible flatfoot can be due to muscular dysfunction, bone malformation, ligament loosening or Achilles tendon shortening. Tibialis posterior tendon and spring ligament are stretched in FFD, decreasing the functional ability of dynamic and static stabilizers and reduces the height of MLA.[9] Intrinsic and extrinsic musculature can support the MLA and increase the arch height with proper strengthening protocols.[17]

Recent studies suggested that to correct foot pronation inducing MLA flattening, increasing the strength of intrinsic and extrinsic muscles is the most effective method.[18] Currently, studies that comparing effect of intrinsic foot muscle training and tibialis posterior muscle training in relation to the dynamic balance of Bharatanatyam dancers are lacking. The purpose of this study was to investigate and compare the effect of intrinsic and extrinsic foot muscles strengthening and how this would affect dynamic balance and dance functions in Bharatanatyam dancers.

30 Bharatanatyam dancers fulfilling inclusion criteria were included in the study. Most of them have started Bharatanatyam practice at a very young age between 4-7 years but, the full maturation of foot arch takes place at the age of 5-6 years. Therefore, excessive strain like loading on the foot with continuous foot tapping over the hard surface produces high level compressive force over the heel, tarsal and metatarsal joints, which may alter the integrity of foot arch structure thus leading to flat foot.[4]

They were allocated to two groups- groups A and B, each containing 15 subjects. Intrinsic muscle strengthening exercises were given to group A and tibialis posterior muscle strengthening exercises given to group B. Both groups received training for 30 minutes, five times a week, for six weeks. Outcomes were measured: foot posture by FPI-6, dynamic balance by SEBT and dance functions by DFOS.

Difference in average mean age, height and weight of the subjects in both groups were negligible.

Y balance test which was developed by Plisky to overcome limitations of traditional SEBT, with good interrater reliability was used to measure dynamic balance.[19]

FPI 6 determines foot posture based on 6 individual criteria, with excellent intra-rater reliability.[20]

DFOS is self-report questionnaire for healthy and injured dancers, focusing on low back and lower extremities to provide detailed information about dancer's quality and capacity to perform complex tasks.[21]

In group A, mean difference of pre and post-test mean scores of SEBT (anterior) on left foot was 1.87. Paired 't' test value of t=4.525 was statistically significant at p<0.001. Mean difference in right foot was 2.60 and paired 't' test value of t=6.703 was statistically significant at p<0.001.

In group B, mean difference of pre and post-test mean scores of SEBT (anterior) in left foot was 2.06. Paired 't' test value of t=6.546 was statistically significant at p<0.001. Mean difference in right foot was 1.73 and paired 't' test value of t=3.591 was statistically significant at p<0.01.

Independent 't' test values was not statistically significant at p< 0.05 level. This clearly infers that there is an equal and significant improvement in SEBT (anterior) of both groups

In group A, mean difference of pre and post-test mean score of SEBT (Postero-medial) in left foot was 1.93. Paired 't' test value of t=6.808 was statistically significant at p<0.001. Mean difference score of pre and post-test mean score in right foot was 2.13. Paired 't' test value of t=5.870 was statistically significant at p<0.001.

In group B, mean difference of pre and post-test mean score of SEBT (Postero-medial) in left foot was 2.53. Paired 't' test value of t=8.264 was statistically significant at p<0.001. Mean difference score of pre and post-test mean score in right foot was 2.0. Paired 't' test value of t=7.746 was statistically significant at p<0.001.

Independent 't' test values were not statistically significant at p< 0.05 level. Clearly infers that there is an equal and significant improvement in SEBT (postero medial) of both groups.

In group A, mean difference of pre and post-test mean score of SEBT (Postero-lateral) in left foot was 2.40. Paired 't' test value of t=9.431 was statistically significant at p<0.001. Mean difference in right foot was 2.13. Paired 't' test value of t=6.346 was statistically significant at p<0.001

In group B, mean difference of pre and post-test mean score of SEBT (Postero-lateral) in left foot was 2.20. Paired 't' test value of t=6.454 was statistically significant at p<0.001. Mean difference in right foot was 1.80. Paired 't' test value of t=5.511 was statistically significant at p<0.001.

Independent 't' test values were not statistically significant at p< 0.05 level. This clearly infers that there is an equal and significant improvement in SEBT (postero lateral) in both groups.

In group A, mean difference of pre and post-test mean score in FPI 6 was 1.13. Paired 't' test value of t=8.500 was statistically significant at p<0.001.

In group B, mean difference of pre and post-test mean score in FPI 6 was 0.93. Paired 't' test value of t=6.089 was statistically significant at p<0.001.

Independent 't' test values were not statistically significant at p< 0.05 level. This clearly infers that there is an equal and significant improvement in foot posture in both groups.

In group A, mean difference of pre and post-test mean score in DFOS was 0.87. Paired 't' test value of t=2.827 was statistically significant at p<0.05.

In group B, mean difference of pre and post-test mean score in DFOS was 1.20. Paired 't' test value of t=4.294 was statistically significant at p≤0.001.

Independent 't' test values were not statistically significant at p< 0.05 level. This clearly infers that there is an equal and significant improvement in foot posture in both groups.

Result from the statistical analysis of this study supports the null hypothesis which stated that there is no significant difference between the effects of Foot intrinsic muscle training and Tibialis posterior muscle training on dynamic balance in Bharatanatyam dancers. The participants were equally benefited from both intrinsic muscle training and tibialis posterior muscle training in terms of foot posture, dynamic balance and dance performance in Bharatanatyam dancers.

Conclusion

Both the Foot intrinsic muscle training and Tibialis posterior muscle training can significantly improve foot posture, dynamic balance and dance performance in Bharatanatyam dancers and the difference between the changes produced by both the interventions are negligible.

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Effect of OTAGO Exercise Programme on Strength, Balance and Mobility in Elderly: An Experimental Study

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Abstract

Background: Elderly population develops many health related disorders which disrupt their balance and so functional performance. Many treatment options are available and Otago Exercise Programme (OEP) can be more effective hence objective of this study was to find out the effect of OEP on Strength, Balance and Mobility in elderly.

Methodology: In this experimental study, 30 elderly participants with age 60 years and above with the history of falls at least once and walking independently were included. With random sampling, two groups of 15 each were made. Pre assessment was done by time up and go test (TUG), 4 stage balance test, 30 sec chair stand test and 10 metre walk test. OEP comprising of Strengthening and balance exercises were given to experimental group and theraband strengthening was given to control group for 3 sessions/week supervised for 4 weeks and participants were instructed to do same exercises at home for next 4 weeks. Post outcome measures were assessed after 4 and 8 weeks. Adherence was checked by the exercise adherence questionnaire.

Results: The experimental group showed statistically significant improvement in Strength, Balance and Gait speed (P value<0.05) than control group. Mean difference in TUG post treatment score in Group A was 2.733 and Group B was 0.6. Mean difference in 30 sec chair stand test score for Group A was 1.067 for and Group B was 0.2.

Conclusion: Otago Exercise Programme is effective in improving Strength, Balance and Mobility in the elderly, thus preventing falls in them.

Keywords: Aging; Falls; Gait Speed; Timed Get up and Go; Strength.

Introduction

Ageing is characterized by progressive physiological processes where degeneration of organ systems and tissues with consequent loss of functional reserve of these systems. As a person ages, their anatomy and physiology undergo many

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changes that become more apparent with increasing chronological age.[1] Balance is a foundation of our ability to move and function independently. A deterioration of balance function, as a consequence of disease or simply increasing age, will increase the occurrence of clinical balance problems as well as the risk of balance loss and falls. Decreased balance and increased postural sway (oscillating movements of body over feet during relaxed standing) both occur with advancing age.[1] The literature suggests that there are age related changes in the control of spontaneous postural sway, suggesting an increase in the amount of correction activity required to maintain stability. Loss of balance is increased when the subjects are asked to make the movement more rapidly. When difficulty of balance tasks increases, it might increase the power of an head-stabilization-in-space strategy in old people.[2]

Impaired balance is one of the intrinsic factors leading to falls in elderly. Accidental falls are a major health problem and affect one in every three elderly individuals over the age of 60. The occurrence of falls depends on extrinsic factors (related to the environment) and intrinsic factors (related to the subject). Strength and power reduction, gait parameter changes, postural control and visual, functional, and cognitive deficits are the main intrinsic factors for balance loss and fall. Fallers have shown reduced lower limb strength, changes in gait parameters, the worst performance in dynamic balance test, and leads to an increased risk of falls.[3] A 2012 Cochrane Systematic Review conducted and reported that clinical assessment done by a health care provider along with individualized treatment of known identified risk factors, and also referral if needed, and proper follow-up reduces the rate of falls by 24%.[4] Behavioural risk factors include risky behaviours such as hurrying, sedentary lifestyle, and multiple medications. Socio-economic risk factors include low income, low education, inadequate housing, and limited access to health care services. Environmental (extrinsic) risk factors include physical environmental features in the home or community that may pose hazards, such as slippery or uneven surfaces, steps, and poor building design. It is hypothesised that the symptoms of weakness, fatigue, dyspnoea, syncope, and postural hypotension contribute to decrease in activity levels and subsequent physical deterioration that increase risk for fall.[5]

The most common predictors of falls are abnormalities of gait or balance and a history of fall in the past year.[6] Exercise has beneficial physiologic effects in older adults, including effects on strength, aerobic capacity, flexibility, and bone strength.[7] A comprehensive programme of strengthening, balance, and/or endurance training effectively reduces falls and fall risks in older adults.[8] Cumming R. reported that exercises help to prevent falls, but which one is the best from all type of exercise was not very well established. They mentioned that the exercise activities which have shown the best results are Tai Chi, endurance training and intensive strength and home-based exercises prescribed by a physical therapist.[9]

Exercises alone are effective in reducing fall rates in older adults in community and sub-acute settings, whereas multifactorial interventions are more effective in long-term care settings.[10] One programme that encompasses all of these aspects may be the 'Otago exercise programme' (OEP).[11] Otago is a muscle strengthening and balance retraining program delivered at home by a physical therapist with Otago training through a minimum of seven home visits as well as monthly phone calls when there is not a home visit over the course of a year. Otago Exercise programme was developed and tested by the New Zealand Falls Prevention Research Group in New Zealand. It is one of a few fall prevention programs that improves strength and balance and reduces falls and fall related injuries among older adults. It has only been implemented on an individual basis in home settings. It is not known whether the program would be effective in group or long-term care settings.

Many fall prevention programmes are implemented in communities without regards to evidence of its effectiveness. It is very important to Translate the evidence-base into practice but it involves changing the attitudes as well as behaviours of older people, many healthcare professionals and various organisations.[12] Otago has only been implemented on an individual basis in home settings. But its effectiveness in group is not yet proved as well

as adherence and long term effect is not known. Hence the need of the study is to check the effectiveness of Otago exercise programme on balance, strength and gait speed in elderly in the long term care settings as well as to check adherence of this programme.

Methodology

In this experimental study design, 30 elderly participants were selected from Jyeshtha Nagrik Club, Nana-nani park, Bhosari and study was conducted at Dr. D. Y. Patil College of Physiotherapy, Pune. Written Informed Consent was taken from the participants. Ethical approval was taken from Institutional Ethical Committee. Random allocation of the subjects were done by chit method and then they were divided into 2 groups, 15 in experimental group A and 15 in control group B. Participants were included if they are having age 60 years and above, have fallen at least once in the past year, can walk in their home independently with or without a walking aid and Mini Mental Scale score 24 or above. Participants were excluded if they had fall due to syncope, vertigo, severely impaired vision, Disabilities in auditory sensation and vestibular organs, Neurological conditions like Stroke, Parkinson, etc and Fractures in the past year and severe deformities in lower extremities. Pre assessment was taken by the following outcome measures- 30 sec chair stand test, 4 stage balance test, Time up and go test and 10 metre walk test. Group A received Otago Exercise Program which consist of flexibility exercises, strengthening and balance exercises and walking plan; group B received thera-band strengthening exercises for all the lower limb muscles and walking plan. Supervised 3 sessions /week for 4 weeks was conducted and outcome measures were assessed at the end of 4 weeks. Progression was given in between after completion of 2nd week. All participants were told to do the same exercise at their home for another 4 weeks ahead that is self exercise without supervision. This showed self motivation. Exercise pamphlets were given them to help to do exercises. Outcome measures were checked again at the end of 8 week. Adherence questionnaire was given to the participants to check for the adherence of these exercise programmes.

Exercise protocol for Group A:

- Flexibility exercises:- Head movements, Neck movement, Back extension, Trunk movements- trunk rotations, Ankle movements- plantarflexion and dorsiflexion
- Strengthening exercises-Quad drills, Hams curls, Side hip strengthening for abductors, Calf raises with hold support and with no support, Toe raises with and without hold support
- Balance exercises-Knee bends or squats with and without hold support, Backward walking with and without hold support, Walking and turning around like a figure of eight movement, Sideways walking, Heel toe standing with and without hold support, Heel toe walking with or without hold support, One leg stand with and without hold support for 10 sec then progress to 30 sec, Heel walking with and without hold support, Toe walking with and without hold support, Heel toe walking backwards, Stand to sit with 2 hands, 1 hand and no hands and Stair walking.
- Walking plan:

  Walk upto 30 minutes at their usual pace at least twice a week

  30 minute walk can be broken up into shorter intervals, such as three ten minutes session

- Criterion for Progression of the exercises :-
  - Strengthening: Participants should complete two sets of 10 repetitions before progressing to the next level and Increasing weights should not produce adverse effects if prescribed and done correctly
  - Balance retraining: Progress from holding onto a stable structure to performing the exercise without support
- Precautions to be taken during exercise- Wear appropriate footwear and clothing, Drink water in between the exercise sessions to avoid dehydration, Pace out exercise sessions at regular intervals to avoid fatigue, Avoid exercising in extreme temperatures,

Immediately stop exercise if you feel dizzy, lightheaded or pain in lower limb, upper limb, back or chest pain and Avoid exercising when actually ill with fever.

Statistical Analysis: The outcome measures score was recorded and tabulated for statistical analysis. SPSS software was used The Pre readings and post readings of all the outcome measures were compared with independent t test. The Repeated Measure ANOVA was then used to analyse the significance of within and between the groups for all the outcome measures. Level of significance was kept at 0.05%.

Results

Table 1: Demographic details of both groups

	Group A	Group B
Females	5	4
Males	10	11
Age	71.4 ± 7.268	66.46 ± 4.533
BMI	27.11 ± 4.82	26.93 ± 5.37

Table 2: pre, post 4 weeks and post 8 weeks parameters of all outcome measures.

Outcome measures	Group A	Group B	Diff.
30 sec chair stand test			
Pre Mean and SD	10.87 ± 1.85	12.20 ± 2.51	-1.33
Post 1 Mean and SD	12.2 ± 1.61	12.6 ± 2.03	-0.4
Post 2 Mean and SD	14 ± 1.65	12.53 ± 1.55	1.47*
4 Stage Balance test			
Pre Mean and SD	5.60 ± 1.06	5.73 ± 0.80	-0.13
Post 1 Mean and SD	8.87 ± 1.06	7.2 ± 1.03	1.67*
Post 2 Mean and SD	9.87 ± 0.35	7.8 ± 1.32	2.07*
Time Up and Go test			
Pre Mean and SD	14.27 ± 2.25	13.67 ± 1.84	0.6
Post 1 Mean and SD	11.87 ± 1.51	12.53 ± 1.41	-0.66
Post 2 Mean and SD	10.6 ± 1.40	11.87 ± 1.41	-1.27*
Gait Speed			
Pre Mean and SD	0.43 ± 0.07	0.44 ± 0.06	-0.01
Post 1 Mean and SD	0.51 ± 0.059	0.48 ± 0.06	0.03
Post 2 Mean and SD	0.57 ± 0.070	0.51 ± 0.06	0.06*

* Statistical significance observed between groups.

Table 1 shows demographic detail of participants from both groups. Age and Body Mass Index of both groups showed non significant difference. Table 2 showed Pre parameters of all 4 outcome measures were analysed using t test and found not significant difference between both groups. Hence there was no baseline difference found in both groups, they were comparable. Comparison of post readings after 4 weeks and 8 weeks between 2 groups was carried out by t test. Group A showed more significant improvement than group B in all the outcome measures including 30 sec chair stand test, 4 stage balance test, Time Up and Go test and 10 metres walk test as $p < 0.001$, but it didn't show significant difference after 4 weeks except 4 Stage Balance test.

Discussion

This purpose of this study was to find whether increase in strength, balance and gait speed which are the intrinsic factors affects falls in elderly or not. We found that significant improvement within and between the groups for all the 3 parameters. Consistent improvement was although seen more in the experimental group of Otago Exercise Program than that of the control group.

The fast twitch type 2 fibres show greater hypertrophy than slow twitch type 1 fibres with strength training. This increase is largely the result of an increase in contractile protein content. The process

of muscle hypertrophy is directly related to an increase in the synthesis rate of myosin. The increase in total contractile protein with strength training occurs without a parallel increase in the total volume of mitochondria within the cells. This adaptation may have an impact on the capability of the muscle to sustain power output. The muscle hypertrophy and increased strength, along with the changes in body composition and hormonal and nervous system adaptations associated with strength training, have a substantial impact on the daily activities of living and functional independence of the elderly. These increase in muscle strength and size were associated with clinically significant improvements in gait speed, balance and functional independence.[13]

The observed improvements in balance were likely attributed to the specific exercise protocols. Balance activities including single-leg standing, tandem walking, heel raises, toe raises, backward walking, mini squats, etc which have contributed to the significant improvement in balance as measured by the 4 Stage Balance test.

TUG assessed ability to maintain balance during timed locomotion and ambulatory transfers. It also correlates with self efficacy (Falls efficacy scale) demonstrating that a relationship existed between fear of falling and functional mobility in the elderly population. Multi-component exercise programs appear to be the most effective interventions for improving the overall health status of frail elderly individuals.[14] This statement is supported by the literature, in which positive effects on functional capacity are more often observed when more than one physical-conditioning component (*i.e.*, strength, endurance, or balance) comprises the exercise intervention,[15] compared with only one type of exercise.[16] Otago exercise was helpful in walking, standing erect, control of the body when it moves in a small range of area, and regaining balance when moving unconsciously. Otago exercise helped walking posture with regard to movement correction and muscle activation pattern and the helped with balance control with regard to the base of support. Otago exercise programme showed a significant increase in strength, balance and mobility in the elderly which are improved by backward walk, walking and turning around, heel to toe walking, and stair walking in the exercise program.[11] These factors are an important predictors or causes of falls in the elderly. The subjects worked on muscle tone, and strength while walking. In addition, through stair walking, the subjects practiced with a fixed foot support, acceleration, balance control, extension and contraction of the lower limb, and ankle dorsiflexion to move the centre of gravity to control the afferent, efferent, and contraction of the lower limb muscles. As a result, coordination and weight shifting were learned through movement of the lower limbs, and this improvement resulted in an increase in mobility or gait. Thus by improving the parameters there can be reduction in the rate of falls among elderly.

Subjects were asked few questions regarding the adherence of the exercise programme which included the easiness or difficulty to perform the exercise by self, frequency of performing the exercise at home and whether the group exercise was giving better results. There was thus 100% adherence seen for both the groups. The newer programme that is Otago Exercise programme was also found to be Adherent to the elderly.

Our study revealed that the factors leading to falls due to ageing such as decreased strength, impaired balance and gait speed improved well after undergoing Otago Exercise training programme. Otago Exercise programme was also found to be effective in long term and also adherent in the elderly.

Further research can be done for various other neurological condition like parkinsons disease, stroke (with minimum gait score) and in various age groups of elderly each separately.

Conclusion

The study concludes that the Otago Exercise Programme was found to be effective in the long term care in improving the Strength, Balance and Gait speed in the elderly, thus reducing the risk of falls in the elderly. It also concluded that the adherence of the Otago Exercise Programme was very good in the elderly.

Conflict of Interest: There is no conflict of interest in the study

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Review Article

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Risk Factors of Prolapse Lumbar Intervertebral Disc (PLID): A Synthesis of Short Review

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Abstract

Introduction: LDH, defined as the localized displacement of disc material beyond the margins of the intervertebral disc space is considered the most common cause of lumbosacral radiculopathy. Compared with nonspecific low back pain without radiating leg pain, LDH is associated with radiating pain/ radiculopathy,severe pain, disability, healthcare use and intervention.

Objectives: To explorethe risk-factors associated with PLID/ LDH.

Literature: In this review, best evidence synthesis included systemic reviews, cohort studies and case-control studies that investigated the risk factors for LDH/ PLID.

Critiques: LDH with radiculopathy results from complex relationships between individual, behavioural, and work-related variables. Evidence revealed that- age, sex, education, BMI, cardiovascular risk factors, smoking, occupational lumbar load by forward bending postures and manual materials handling, perceived risk of work injury, decision freedom at work, regular or irregular three-shift work or regular night work in and time pressure at work are associated with the development. It is also found that manual occupation, genetics, and previous back pain may contribute to the development of LDH with radiculopathy in adults.

Conclusion: Although the literature is varying quality and heterogeneous, but the evidence revealed that LDH/ PLID is an important source of pain and disability in society. Future research should focus on prospective designs examining modifiable risk factors and prevention strategies.

Keywords: PLID; Lumbar Radiculopathy; Associated risk factors.

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Background

Low back pain is a leading cause of disability and associated with a large economic burden on individuals, industry and society.[1] Radiculopathy due to lumbar disc herniation (LDH) is one of the most recognizable presentations of low back pain. The diagnosis is typically based on a combination of symptoms and signs suggesting lumbar spinal nerve root compression or irritation, such as nerve root tension signs, neurologic deficits, and advanced imaging findings that correlate with the clinical syndrome.[2]

LDH, defined as the localized displacement of disc material beyond the margins of the intervertebral disc space,[3] is considered the most common cause of lumbosacral rediculopathy.[4] Compared with nonspecific low back pain without radiating leg pain, LDH with radiculopathy is associated with greater pain, disability, healthcare use and intervention.[5]

Previous studies of symptomatic LDH have reported a point prevalence of about 5% among the general adult population[6] varying by sex and age. In people aged 25–55 years, 95% of symptomatic herniated discs occur at the lower lumbar spine (L4-L5 and L5-S1 levels).[7] However, we know very little about the incidence of LDH and therefore risk factors are not well understood.

The objective of this review was to synthesize the best available evidence on the incidence and determinants of LDH with radiculopathy. Our aim was to create a baseline of the best scientific evidence to inform clinicians, researchers and policymakers about the risk factors of LDH/ PLID.

Review of Literature

In this review, best evidence synthesis included systemic reviews,cohort studies and case-control studies that investigated the risk factors for LDH/ PLID.

Age: Incidence of LDH with radiculopathy increases with age, peaking about the fourth and fifth decades of life, and then decreases in later life. [8,9]

Gender: Men have more risk than women.[8,10] Although, one study found no association between gender and the development of LDH with sciatica in Finnish forestry workers.[9]

Education: Incidence of LDH with radiculopathy decreases with years of education.[8] Another study found no association between education and the risk of LDH.[11]

Income: The evidence linking income and the risk of hospitalized LDH varies in one to another study. In their Phase III analysis, Leino-Arjas and colleagues found an increased incidence of hospital care due to LDH across lower quintiles of personal net income compared to the highest quintile.[8]

Socioeconomic status: One study found a higher risk among middle class men.[12] Another study reported some indication of an association between higher social class and LDH in women, but no association in men.[13]

Race: Preliminary evidence from two studies suggests that race is not associated with the incidence of LDH with radiculopathy.[13]

Occupation: It is preliminary evidence that manual occupations are associated with the risk of LDH with radiculopathy. One study reported a greater risk for LDH with radiculopathy in male concrete workers compared with male house painters,[14] in female assistant nurses compared with all Danish females. in machine operators and carpenters compared with office workers,[13] and in manual occupations compared with upper white-collar occupations.[15]

Body mass index and obesity: The association seems to differ in women and men where women, evidence from two studies [8,16] indicates that the incidence of LDH with radiculopathy increases with obesity but not in men. However, three studies found a positive association in men.

Genetics: Five studies reported an increased risk of LDH for polymorphisms and sequence variations (mutations) involving inflammatory mediator;[17] cartilage collagen genes;[18] intervertebral disc extracellular matrix protein genes, the human sickle tail gene and, the cartilage intermediate layer protein gene.[19]

Cardiovascular risk factors: one study revealed that cardiovascular risk factors, including diabetes, high cholesterol, hypertension, and a family history of coronary heart disease, are associated with an increased risk of LDH with radiculopathy in women,[20] and no study examined these associations in men.

Muscular strength: Preliminary one study suggests that back and abdominal musculature strength is not associated with the incidence of LDH with radiculopathy.[14]

History of musculoskeletal symptoms and injuries: Preliminary evidence on history of back pain increases the risk of LDH with radiculopathy.[14] Three studies explored those have a history of back symptoms or low back pain were at greater risk of developing clinical LDH (sciatica) than those without a history of back pain[13] where another reported no association between a history of back accidents or low back injuries and LDH with radiculopathy or sciatica.[9]

Smoking: Incidence of LDH with radiculopathy increases with smoking.[15] However, 4 studies found no association between smoking and the risk of LDH with radiculopathy.[12]

Physical or sports activity: One study reported an increased incidence of clinical LDH (sciatica) associated with walking, but a decreased incidence associated with jogging.[9] Another study found a positive association between the frequency of participation in sports clubs (4-5 times per week) and risk of LDH surgery in women, but not in men.[16]

Non-occupational lifting, bending and other activities: Preliminary evidence from one study suggests that out-of-job lifting with the knees straight, back bent where starting and ending lifts at the waist may be positively associated with an increasedincidence of LDH with radiculopathy.[15]

Car driving and motor vehicle characteristics: Two older studies explored an increased incidence of LDH with radiculopathy in persons driving non-Japanese and non-Swedish cars but no association was reported for driving pattern characteristics, such as use of local roads, highways, bucket seats, regular seats, automatic or manual transmission, and being the driver or passenger.[15]

Psychological stress and personality: The evidence varies in studies found an increased incidence of LDH in those who reported: mental stress "to some extent" or "rather much or much".[9] However, 4 other studies reported no associations between the risk of LDH with radiculopathy and personal mental stress.[14]

Forward bending postures: Evidence from two studies that occupational lumbar load from forward bending is positively associated where increased incidence of LDH with radiculopathy in: i) both men and women with aggregate lumbar load by intensive-load postures (postures with trunk inclination of ≥20-degrees) at work,[15] and ii) men with increased work hours of extreme forward bending (>90-degrees trunk flexion). [21]

Physical workload or difficulty of work: One study from Germany, found some indication of a positive association between working ≥10 years in occupations with high physical workload and LDH,[21] while another study found a positive association in women, but no association in men.[22]

Time pressure, job control and other psychosocial factors at work: Study indicating a link between time pressure at work and the risk of LDH with radiculopathy that the men and likely to experience LDH with radiculopathy compared to those who reported no work years with high time pressure,[21] but no association for other psychosocial characteristics of work as monotonous, boring, opportunities to use knowledge and skills, information about future plans, satisfaction with supervisor, satisfaction with workmates, psychic strain through contact with clients, and too much responsibility.

Summary and Critiques

The evidence suggests that the etiology of LDH/ PLID is multifaceted. While there is evidence that several occupational factors are important contributors to the development of LDH with radiculopathy, it is also clear that other individual and behavioural factors may contribute to the development of the condition. For instance, although high cumulative lumbar load from occupational forward bending is a strong risk factor for LDH with

radiculopathy, not every person exposed to high cumulative lumbar workload will develop LDH. Instead, combinations of risk factors are necessary to cause LDH with radiculopathy and the specific combination of risk factors leading to an episode of the condition likely varies among person to person.

Challenges facedas an author in using different criteria to define cases of LDH with radiculopathy, and the lack of a standard differentiation for the lower range to higher level of severity for LDH/ PLID. Another obvious problem is that many studies do not identify the population at risk that should in an incidence calculation. Many studies report the number of cases admitted to hospitals over a specified time period, but do not provide information on the population at risk for being admitted.

Limitations

Studies also have variable inclusion and exclusion criteria that impact on the interpretation and comparability of the findings. Many of the studies include hospital admissions only. This is problematic since hospital admission policy for LDH with radiculopathy can vary over time and place. In addition, many studies didn't report cases of LDH treated at the emergency department, but not admitted to hospital.

Recommendations

This review highlights many existing gaps in knowledge of the epidemiology of LDH. Further descriptive and analytic investigations are needed as the incidence and determinants of this neuro-musculoskeletal condition have not been adequately described or examined.

We recommend that better studies will differentiate modifiable and un-modifiable risk factors to inform evidence-based prevention and intervention programs.

Conclusion

Despite the limitations of this literature, there are some important conclusions that can be made. Thus, we have limited information on risk factors for LDH with radiculopathy in adults. Nonetheless, some evidence suggests that age and sex are non-modifiable risk factors for LDH and modifiable risk factors include lower education, higher BMI and the presence of cardiovascular risk factors in women, smoking, greater cumulative occupational lumbar load by forward bending postures and manual materials handling, higher levels of perceived risk of work injury, lower job control or decision latitude at work, regular or irregular three-shift work or regular night work in women, and increased time pressure at work. Although, the literature is varying quality and heterogeneous but the evidence revealed that LDH/ PLID is an important source of pain and disability in society. Future research should focus on prospective designs examining modifiable risk factors and prevention strategies.

Ethical Clearance

The proposal of the "Short Review" was presented to the Institutional Review Board (IRB) of Bangladesh Health Professions Institute (BHPI) and taken permission accordingly.

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Conflict of interest statement of all authors:

- The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Gentle Respiratory Exercise vs Incentive Spirometry in Patients with COVID Pneumonia: An Observational Study

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Abstract

Background: Respiratory therapy is an important component of care in patients with COVID and other infective causes of pneumonia with possible long term benefits. While various types of respiratory exercises can be done in this situation, studies comparing the various forms of chest physiotherapy are limited. It is important to identify a simple lung exercise which is tolerated well to ensure its regular practise.

Aim: To compare tolerability of gentle respiratory exercise and incentive spirometry in non- critical patients with COVID pneumonia.

Methods: An observational study was undertaken between May 2021 to June 2021 in patients admitted to ward with COVID pneumonia. Demographic and clinical details of the patients were noted. The number of attempts of both type of exercises and their tolerance were recorded and compared.

Results: 142 patients underwent gentle respiratory exercise and 57 patients underwent incentive spirometry. There was no difference in age, sex, comorbidities, oxygen requirement or HRCT score in either groups. The number of exercise attempts tolerated in gentle respiratory exercise group was significantly higher than the incentive spirometry group (p= 0.027).

Conclusion: Gentle respiratory exercises are tolerated better by patients with mild / moderate COVID-19 pneumonia compared to incentive spirometry.

Keywords: COVID pneumonia; chest physiotherapy; gentle respiratory exercise; incentive spirometry.

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Introduction

The first and second waves of COVID 19 infection caused disease which primarily affected the lungs. It lead to interstitial pneumonia which had the potential to cause severe hypoxemia and ARDS. Around 42% patients requiring hospitalisation in the first wave require oxygen supplementation.[1] Respiratory therapy is an integral element of multidisciplinary care required by these patients. Studies have demonstrated that physiotherapy team has an essential role in the recovery of hospitalised patients.[2] Physiotherapy can contribute to improved oxygenation and airway clearance in pneumonia. Specifically, a position statement paper described the role of exercise on improving immune function in COVID -19 patients.[3] While aggressive techniques of chest physiotherapy are considered to be detrimental in pneumonia, specific data demonstrating superiority of one method over the other, especially in mild/ moderate cases is lacking. We undertook this study to compare 2 techniques of chest physiotherapy in patients with mild and moderate COVID-19 infection in our hospital.

Aim

To compare tolerability of gentle respiratory exercise and incentive spirometry in non- critical patients with COVID pneumonia

Methods

This was observational study which enrolled all patients with COVID pneumonia with no or mild respiratory distress admitted to our hospital ward between May 2021- June 2021. Critical patients requiring ICU admission were excluded . The study was approved by the institutional ethics committee (Approval number: 1306/2021). The same team of chest physiotherapists attended to the admitted patients daily. Every patient was taught the techniques of gentle respiratory exercise and incentive spirometry at the first encounter. They were asked to choose to do either or both as part of their daily exercise regimen subsequently. Verbal consent of all patients was taken. Patients who refused to give consent for either form of exercise were excluded. Nebulisation and medications were similar in both groups as per the hospital COVID protocol. Mobilisation was carried out for both groups after the treating physician's permission if the patient was clinically stable (stable respiratory and hemodynamic function).

Gentle respiratory exercise consisted of a slow instructed deep breathing exercise done by the patient in either a sitting or supine position, with the head and back supported and shoulders and upper chest relaxed. The patient was asked to place a hand over the anterior abdomen to feel the rise and fall during inspiration and expiration respectively. Inspiration was slow up to the count of 4 and expiration was longer up to the count of 7. The counts were instructed by the physiotherapist. Both phases of respiration where gentle, with no forceful effort. A repetition of this breathing exercise 3 times in the day was carried out for improved respiratory function (gas exchange), increased lung volumes, better chest expansion and improving inspiratory muscle strength and endurance.

The other technique used consisted of incentive spirometry using a mouthpiece spirometer. The goal of the exercise was to rise the ball up to the pre-marked level and maintain it there during inspiration. This was followed by breath holding for 3-5 seconds and slow exhalation. This exercise was repeated 3 times in a day under supervision.

Either exercise was aborted if patient developed desaturation < 90%, excessive coughing, perspiration, nausea, vomiting, dizziness or developed subjective feeling of breathlessness or chest pain. Other signs indicating need to stop included heart rate > 120 beats/min or arrhythmias. These were recorded as signs of intolerance. Cumulative number of attempts in both groups and tolerance was noted.

The analysis included profiling of patients on demographic, nutritional, clinical and radiological parameters. Quantitative data were presented in terms of mean and standard deviation. Categorical data were presented in absolute number and percentage. Independent student t-test was used for testing of mean difference between two independent groups. Cross tables were generated and chi-square test was used for testing of association. All statistical analysis was done using SPSS Ver.23.0.p-value<0.05 was considered as statistically significant.

Results

There were a total of 142 patients who underwent gentle respiratory exercise and 57 patients who underwent incentive spirometry. Both groups of patients were similar in demographic and clinical characteristics. There was no difference in age, sex, presence of comorbidities or body mass index in both groups. There was no difference in the body mass index, oxygen requirement, high-resolution computed tomography (HRCT) score in either groups. There was no difference in oxygen requirement, or hospital stay in both groups.

In the gentle respiratory exercise group, the total number of exercise attempts was 1663. Of these, 1280 exercise attempts were successfully tolerated. In the incentive spirometry group, the total number of exercise attempts was 797, of which 452 attempts were successfully tolerated. In the 728 attempts which were not tolerated in both groups, the causes were: excessive coughing in 38% (n=277), breathlessness in 25% (n= 182), dizziness/light headedness in 19% (n= 138), excessive perspiration in 16% (n=116) and transient desaturation in 2% (n= 15). On aborting the exercise, all symptoms were relieved and desaturation improved within few minutes. None of the patients developed any arrhythmias during the exercises. The ratio of number of exercise attempts tolerated/ total number of attempts in gentle respiratory exercise group (0.77 ±0.6) was significantly higher than the incentive spirometry group (0.57±0.2; p = 0.027) (Table 1).

Table 1: Comparison of clinical parameters between the two study groups

	Gentle respiratory exercise n=142	**Incentive Spirometry n= 57**	**p - value**
HRCT score	22.3±8.5	20.8±8.2	0.282
Comorbidities			
Diabetes	43(30.3%)	17(29.8%)	0.949
Pre-Existing Chronic Lung Problems / Asthma	3(2.1%)	1(1.8%)	0.871
Hypertension	49(34.5%)	23(40.4%)	0.438
Oxygen requirement			
0- 5 L	114(81.4%)	42(71.2%)	0.448
6-10 L	7(5%)	6(10.1%)	
11-15 L	4(2.9%)	3(5.4%)	
15 L	15(10.7%)	8(14.3%)	
ICU shift	20(14.1%)	4(7%)	0.644
Number of days in hospital	11.7±8.5	14±8.6	0.090
Ratio of number of exercise attempts tolerated /total number of attempts)	0.77±0.6	.77±0.6	0.027*

*p-value < 0.005, statistically significant

Discussion

During COVID 19 infection, the virus enters the respiratory system and binds to angiotensin converting enzyme 2 (ACE2) in alveolar cells and damages them. This results in respiratory problems. The initial symptom is dry cough due to epithelial cell involvement, progressing to dyspnoea and in some cases mucous hypersecretion due to exudative consolidation. While chest physiotherapy has been used in various respiratory conditions, evidence is lacking on its effects in COVID-19, especially in the acute stage. This is due to the difference in nature of respiratory problems caused by COVID-19 compared to other respiratory conditions. Also, administering

chest physiotherapy to COVID -19 patients carries the risk of aerosol generation which is an additional concern. Use of protective gear and disinfection of the environment thus becomes of paramount importance when chest physiotherapy is being considered in such patients.

The role of chest physiotherapy especially in mild stages is unclear, as the argument against its use is based on the non-exudative nature of the early disease. However it may have an advantage of relieving dyspnoea and anxiety and prevent progression to severe disease (4). Evidence on the use of chest physiotherapy in acute stages are scarce and anecdotal. Our study was an attempt to evaluate the 2 simple techniques in mild / moderate COVID-19 pneumonia.

Incentive spirometry is lung expansion technique which uses sustained maximal inspiration. It can help to improve ventilation perfusion mismatch and optimize oxygenation via splinting and prevention of collapse of alveoli, hence can be considered as an intervention to treat patients with mild to moderate COVID 19 disease.[5] Research has found conflicting results on the effectiveness of using incentive spirometer compared with other lung strengthening techniques. Many of the studies looking at potential benefits were poorly designed and not organised. Theoretically, it may help with improving lung function, reducing mucus buildup, strengthening lungs during extended rest, lowering the chance of developing lung infections. A randomized controlled trial of 50 patients showed that incentive spirometry could be used to prevent pulmonary complications in rib fracture patients.[6] Studies comparing gentle respiratory exercise and incentive spirometry are few. A randomized control trial in post laparotomy by Tyson et al found both techniques to be similar.[7]

Gentle respiratory exercise, apart from its effect on lung expansion enhances autonomic and cerebral activities related to emotional control and psychological well-being.[8] These may have an additional beneficial effect in the patient in COVID -19 due to isolation induced mental stress in this disease. We found that our patients had significantly better tolerance to gentle respiratory exercise compared to incentive spirometry. Decrease in stress, promotion in relaxation and improvement in cardiovascular parameters may be some of the reasons which could explain its better tolerance.[9]

Our study was observational in nature, with a limited sample size. Further large scale studies are needed to understand the ideal chest physiotherapy technique in such patients and the long term implications. However it does appear that gentle respiratory exercise is tolerated well and probably has a positive impact on patients with mild/ moderate pneumonia faced with the additional stress of isolation. It is a technique which is easy to teach and due to better tolerance, repeated practise of the technique by the patient seems feasible. It is plausible that initiation and practise of gentle respiratory technique may help to maintain better lung function in the long run.

Conclusion

Gentle respiratory exercises are tolerated better by patients with mild / moderate COVID-19 pneumonia compared to incentive spirometry. It is important to further scrutinize its role with respect to compliance, practise and long term benefits on lung function in patients with COVID-19 infection.

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Original Article

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To Study the Correlation between Body Image and Self Esteem in Adolescents and Young Adults Aged 18-25 Years of Age

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Abstract

In the current scenario that we live in, the bitter truth is that we define beauty by what is on the outside and visible to the naked eye. The body image of a person plays such a huge role in one's life that we constantly strive to achieve the perfect body. This has led to various mental, behavioural and emotional issues. Unfortunately people have even lowered their self-esteem. Body image and self-esteem have a great impact on the quality of life and well-being of every individual. So the research aims to establish a relationship between body image and self-esteem among adolescents and young adults.

The data was collected using Rosenberg's Self-Esteem Scale, Body Shape Questionnaire and Body Mass Index and it was analysed using correlation test. The results show that there exists correlation between body image and self-esteem adolescents and young adults. The study helped occupational therapists plan an intervention without stigma or judgment.

Keywords: Adolescents; Body Image; Self Esteem; Young Adults; Occupational Therapy.

Introduction

We exist in a world today where everything can be faked or fixed stomachs can be tightened, filters are used and all because that's what we're told to which is to change ourselves to be beautiful. Body image is the thoughts, feelings and perceptions of a person about the aesthetic or sexual attraction of their own body. Body image can be negative ("body negative") or positive ("body positive"). People with negative body images may feel uncomfortable or embarrassed, and they may find other people more attractive.[1]

Many teenagers have questions and concerns about their bodies. They continuously think about

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their appearance which seems in a constant state of change during adolescence. Everyone has an "image" of their body and appearance and how it fits in what they consider normal, acceptable, or attractive. For adolescents, body image is a part of their self-image. They are very much sensitive and responsive regarding criticism about their body image which they find irritating and they perceive negatively things like comments and taunts.[2] Many of them begin to lose self-esteem or confidence if they get unfavorable or bad comments about their appearance, physical abilities, social looks, ethnic features and changes in their body that are linked with puberty. To focus equally on all aspects of their lives, they need to give equal importance to other major factors such as mental aptitude, their personalities and inner strengths, artistic and musical talents etc. that also contribute significantly in the making of the overall self-image.[3]

An era in which social media occupies a very important place and is used frequently in our daily lives. People of different ages and genders will be affected emotionally and psychologically by the ideal appearance and body size / shape set by the society in which they live. Cash and Smolak point out that the concern with body is a common characteristic of both sexes. Body image has different aspects in our life as well like, the way you perceive your body is not always an accurate representation of how you actually appear. For example, a person may believe they are overweight when, in fact, they are underweight. How a person sees themselves is there **Perceptual body image**. There are aspects of a person's appearance that they may enjoy or detest. Your feelings about your body, particularly the level of satisfaction or dissatisfaction you feel about your appearance, weight, shape, and body parts, are your **Affective body image**. Some people think that if they are thinner, they will feel better about themselves. Others think that if they gain muscle, they will look better. The way you think about your body is your **Cognitive body image.** When a person is dissatisfied with their appearance, they can take destructive measures, such as excessive exercise or eating disorders, as a means of changing their appearance. Some people may isolate themselves because they feel bad for their appearance. The behaviour you engage in as a result of your body image includes your **Behavioural body image.**[4]

The level of confidence also known as self-esteem is determined by how much a person believes in his/her own worth and also by his/her perception of the degree of respect shown to him/her by others. Self-esteem is essential since liking oneself can influence one's emotional wellness and how one may act in a particular situation.[2]

Environmental influences play an important role in how people view and feel about their bodies. A person's family, friends, acquaintances, teachers, and the media all have an impact on how people look and feel about themselves and their physical appearance. In particular, when an individual is in an appearance-oriented environment or received negative comments about their appearance, such as being teased, they have an increased risk of dissatisfaction with their appearance which further also affect their self-esteem and how they perceive other things. People of all ages are attacked by images through media such as television, magazines, the Internet and advertising. These images are often unrealistic, difficult to achieve, and are highly stylized, upholding the ideals of beauty and appearance for the men and women in our society.[5] Similarly Self-esteem of a person is influenced by factors such as body image, body weight, academic performance, and sporting ability and participation. In particular, heavier body weight has been found to predict lower self-esteem in people and one of the major factors for affecting self-esteem. The term self-esteem is usually used to describe a person's overall subjective sense of personal worth or value. In other words, self-esteem may be defined as how much you appreciate and like yourself regardless of the circumstances.[6] Your self-esteem affects your decision-making process, your relationships, your emotional health, and your overall well-being. It also influence motivation, a person with a healthy and positive outlook may understand their potential and feel motivated to take on new challenges. People with low self-esteem tend to feel less confident in their abilities and question their decision-making process. They don't believe they can reach their goals, so they may not feel the motivation to try something new. Those with low self-esteem may have issues with relationships and

expressing their needs. They may also experience low levels of confidence and feel unlovable and unworthy.[7] Many researchers have written about the dynamics involved in the development of self-esteem. Maslow suggested that individuals need both appreciation from other people and inner self-respect to build esteem. These both needs must be fulfilled for an individual to grow as a person and reach self-actualization. Self-esteem and body image are two of the most profound feeling, thought and behaviour of adolescent's. Comparing one's own body to another's cannot be satisfied because it cannot be measured. The social media craze and the use of Photoshop leads people to believe that there is a standard of beauty. However, this is usually not realistic. If it's not real, that's also unattainable. Nevertheless, most people suffer from low self-esteem. On the other hand if we see people who love their bodies regardless of the differences are more likely to be confident and happy with their lives. A positive body image involves being comfortable in appearance, understanding that appearance has nothing to do with your ability or worth to eat healthy to meet your body's needs [(9)]. When you have an active and healthy body image, you feel more capable and energetic. You maintain realistic expectations, respect yourself, and as a result increase your self-esteem.

Aims and Objectives

- The aim of the present study is to find the relationship between perceived body image and self-esteem among adolescents and young adults.
- The objective was to determine correlation between body image and self-esteem with respect to body mass index.
- To find the gender difference in the perception of body image and self-esteem among adolescents and young adults.

Methodology

- **Study Design**: Survey
- **Sample Size**: 149 subjects
- **Source of Study**: Community
- **Population**: Indian Population
- **Sampling Method**: Convenience
- **Inclusion Criteria**: Any person within the age group 18-25 years dissatisfied with his or her body image in context of body mass.
- **Exclusion Criteria**:

1. Adolescent diagnosed with any psychiatric condition.
2. Adolescent having a medical condition of long-term nature (epilepsy, and others)
3. Participants without internet access.

- Withdrawal Criteria:

1. Adolescent not willing to participate.
2. Adolescent who does not complete the protocol due to any reason.

Outcome Measures

1. **The Rosenberg Self-Esteem Scale (RSES; Rosenberg, 1965),** a widely used self-report instrument for evaluating individual self-esteem. The Rosenberg self-esteem scale, developed by the sociologist Morris Rosenberg, is a self-esteem measure widely used in social-science research. It uses a scale of 0–30 where a score less than 15 may indicate a problematic low self-esteem. The RSES is designed similar to the social-survey questionnaires. A 10-item scale that measures global self-worth by measuring both positive and negative feelings about the self. The scale is believed to be uni-dimensional. All items are answered using a 4-point Likert scale format ranging from strongly agree to strongly disagree.

   The scale has been designed specifically for brevity and ease of administration and has been reported to have high reliability (2week test–retest ±85) and acceptable convergent validity, with correlations ranging from $\bar{r}$ ±56 to $\bar{r}$ ±83 between the RSES and similar measures (e.g. Coppersmith Self-Esteem Inventory: $\bar{r}$ ±59). Discriminate validity is also considered substantial, with correlations of between $\bar{r}$ ±21 and ±53 with various self-stability measures and ratings of others (Silber & Tippett,1965).

2. **Body Shape Questionnaire (BSQ-16B).** It is a self-report measure of the body shape preoccupations typical of bulimia nervosa and anorexia nervosa. It was first reported

in: Cooper, P.J., M.J. Taylor, Z. Cooper & C.G. Fairburn (1986). The development and validation of the Body Shape Questionnaire. International Journal of Eating Disorders 6: 485-494.

The scoring of the short forms is based on the same principle: add up the scores on the items. Very roughly, you can convert a score on a 16 item version to what its equivalent is on the full BSQ by multiplying the score on the 16 item version by 34/16. By the same principle you can convert scores on any 8 item version to BSQ equivalent score by multiplying by 34/8. Bear in mind that this IS approximate: because different items will have different probabilities of being scored positively at the same level of body shape preoccupation a score on one item is not equivalent to a score on another item and a so such rescaling is always only a guide.

3. **Body Mass Index**: Body Mass Index (BMI) is the ratio of body weight to height in normal build people [BMI= weight (kg)/height(m); Keys, Fidanza, Karronen, Kimura, & Taylor, 1972]. Originally defined by Quetlet in 1869, BMI has become accepted as a highly convenient, valid, and reliable indicator of obesity. Garrow and Webster (1985) found that BMI provided a measure of fatness that corresponds highly with specialised laboratory methods, and provides an estimate of size that is more useful than percentage of fat. Normative ranges for Quetlets' Indices} BMI are defined as:

   (1)<15—emaciated;

   (2) 15–19—underweight;

   (3) 20–24—normal

   (4) 25–29—overweight; and

   (5)>29—obese.

   In consideration of the normal changes in body proportions that accompany age, in the present study, BMI was adjusted for adolescents by dividing the actual body mass by expected body mass (based upon calculation of expected weight for age) then multiplied by 100 to derive a Body Mass (Co ates,Boyce,Muller,Mearns,&Godfrey,1980). Body mass percentile ranks, for the purpose of this paper, have been defined as:

   (1) Below 90% - Underweight;

   (2) 90%–110% - Normal;

   (3) 111%–120% - Overweight;

   (4) above 120% - Obese.

Participants

The study was carried out through an online survey among adolescents. The objectives of study were explained and people were requested to participate. A brief introduction about the objectives of the study was given to the subjects. Confidentiality was assured. A total of 149 subjects participated in the study. Information on age, class, marital status, place of origin, current place of stay, family type and income; and clinical details such as history of physical and psychiatric illness, menstrual history, family history of physical and psychiatric illness, details of family outlook, emphasis on physical appearance and family preference for health foods was obtained.

The participants in this study were a sample of convenience, predominantly recruited through personal and professional networks. The sample included 149 subjects. All the participants were Indian. All the participants were selected based on an inclusion criterion. The purpose of the study was described, Prior to data collection and consent was obtained. Participants were assured of anonymity and confidentiality.

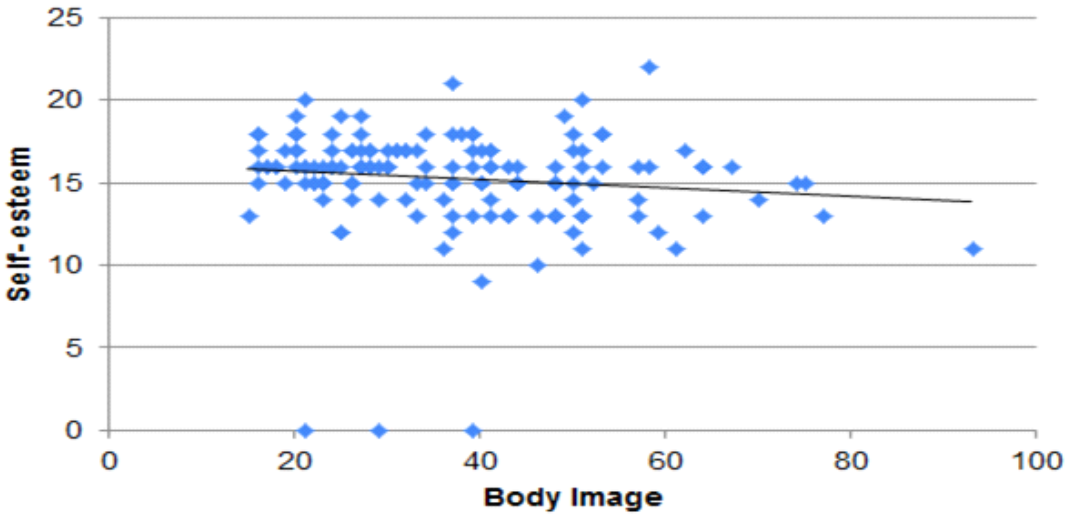
Procedure

The study was presented to the participants as an investigation of body image relationship with self-esteem. After receiving their informed consent, the participants were asked to complete an online form that included a questionnaire. All respondents completed the questionnaires on an anonymous and voluntary basis. It took 10 minutes to complete the entire questionnaire. Participants were given the option of receiving the results of their assessment.

Data Analysis

1. Complete data was gathered in the form of a master chart made on Microsoft Excel 2010.
2. The statistical analysis was conducted using Statistical Package for the Social Sciences 21 (SPSS v.21). Statistical significance at p </= 0.05 was assumed.
3. Pearson's correlation was used to find the relationship between body image and self esteem & Correlation between BMI and self-esteem.
4. Descriptive analysis included percentages, means and SD.

A total of 149 subjects participated in the study. To study the significance of the relationship between body image and self-esteem on the basis of different types of responses for male and female recipients.



Graph 1- Correlation between body image and self-esteem

Discussion

Body image and self-esteem are two major factors of an individual's personality that are linked together. Positive thoughts, perceptions and attitude towards body image contribute in making a positive personality.[10] Self-perception depends on one's musings about their personality, their mentality and sentiments, and the way their body looks. On the contrary, confidence is based on how much one likes oneself, and how one perceives or values his/ her individual character, qualities, aptitudes, and achievements. Youngsters who have low confidence may not generally feel certain about themselves or what they look like. Individuals with great confidence regularly have a constructive and certain disposition about their body and mind, can perceive their qualities and also maintain their individual esteem and worth.[11-13]

The results show that there is a relationship between perceived body image and self-esteem among adolescents and young adults. Self-esteem grows up in adolescents and young adults through positive body image. If self-body image is negative and unfavorable then it prompts distress and dissatisfaction with oneself which leads to a low level of self-esteem.

The study states that female adolescents and young adults have a low level of confidence in their body image as compared to male adolescents and young adults. This shows that male adolescents and young adults have more familiarity with their body image.

The male adolescents have a higher level of self-esteem as compared to female adolescents. The younger adolescents have a higher state of confidence

in their body image as compared to older adolescents. As per findings of the research, the seventh grade girls faced more problems in the new environment as compared to boys and girls who remained in the same school. Moreover, girls with multiple problems including change of school and reaching puberty suffered with the lowest self-esteem.[14-17]

The older adolescent females have a higher self-esteem as compared to younger adolescent females. The girls who study magazines focused at grown women are more dissatisfied with their outlook. Most of these studies suggest that girls are more vulnerable than boys to physical changes; this vulnerability tends to turn in to a greater level of body and weight dissatisfaction which reflect slow self-esteem.[18] Age is another factor that influences body satisfaction and self-esteem. Body image and self-esteem are two major factors of an individual's personality that are linked together. Positive thoughts, perceptions and attitude towards body image contribute in making a positive personality. Self-perception depends on one's musings about their personality, their mentality and sentiments, and the way their body looks.[19-22]

Conclusion

The results are analyzed on the basis of the assumptions in previous studies that females report being more conscious about their weight as compared to males but the findings state that a significant impact of body image on self-esteem has been supported by the current study.

Results show that confidence in body image is higher in adolescent males as compared to adolescent females. Young adult females have a higher level of self-esteem. Educated adolescent males have a high level of confidence in their body image.

So, there is a relationship between perceived body image and self-esteem among adolescents and young adults.

Limitations

1. Sample was taken from only Delhi, which cannot be generalized to other settings.
2. Sample size for finding the relationship was small; therefore results could not be generalized to masses.
3. No Intervention was given.

Recommendations

1. Further studies with a larger sample size should be done.
2. Scales with more reliability can be used for better results.
3. Study was a survey. The design can be changed to pre-post experimental design or comparative so that results can be seen with distinction.
4. Further studies are needed to give intervention to these subjects.

Further Implications

Occupational therapy lifestyle intervention has been shown to lead to significant positive changes in mental health and social functioning, and decrease depressive symptoms leading to health care savings exceeding the cost of intervention. Occupational therapy intervention strategies (e.g., environmental modification, wellness-promoting activities) have been found to save money by improving health status and quality of life.

Occupational therapy's value lies in improving health and quality of life through facilitating participation and engagement in occupations and familiar activities of everyday life. Occupational therapy is client-centred, achieves positive outcomes, and is cost-effective.

Hence, the study has implications for health education of the adolescents and young adults. Adolescents and young adults with a distorted perception of body weight may set unrealistic goals and choose unhealthy behaviors to control their weight. As an **Occupational Therapist** we need to educate adolescents and young adults about their normal weight range and methods to maintain appropriate weight through proper diet and exercise. Occupational therapy helps them attain a realistic, positive perception of their weight in order to prevent depression and lowered self-esteem. Professionals should also encourage and support healthy eating patterns and physical activity while encouraging adolescents to recognize personal strengths not related to physique.

Conflict of Interest: The authors report no conflict of interest in this study.

Ethical Clearance: Verbal and written consent were taken from all participants.

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Original Study

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Effect of Saebo^{TM} Orthosis Along with Functional Electrical Stimulation on Hand Function in Patients with Subacute Stroke: A Randomized Controlled Trial

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Abstract

Background: In stroke, there is loss of basic hand function like straightening of the fingers, grip strength and grasping of the item which make dependent for their basic activity of daily living. The Saebo-FlexTM orthotic is a mechanical device, which enables an individual to open hand, pick up the objects and release during tasks-oriented exercises. It facilitating thumb and finger extension movements by recruiting voluntary thumb and finger flexor movement.

Objectives: To determine the effect of FES along with Saebo-FlexTM device on Fugl Meyer assessment score for upper extremity, on Grip Strength, on Pinch Strength and on Hand Dexterity.

Methodology: 20 participants were randomly divided into experimental (Saebo-FlexTM hand orthosis + FES + Conventional physiotherapy) and control (FES + conventional physiotherapy) group. Intervention was given for 45min/session, 5 session/ week for 6 weeks. Assessment was done using Fugl Meyer assessment-upper extremity, Chedock hand inventory programme, Nine-hole peg test, Hand dynamometer and Pinch gauge on Day 0, Day 12 and Day 42 of the intervention period.

Results: The results were found to be non-significant ($p>0.05$) for all outcome measures. Statistically significant results were obtained for FMA-UE ($p=0.018$) on comparison of mean difference scores at Day 0, and Day 42, CAHAI scores ($p=0.011$) on comparison of mean difference scores at Day 0 and Day 42.

Conclusion: According to finding, the integrated intervention of Saebo-FlexTM device along with Functional Electrical Stimulation can be used effectively to improve the upper extremity motor functions in sub acute stroke survivors.

Keywords: Sub acute stroke; Saebo TM Orthosis; Functional Electrical Stimulation; Hand Function.

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Background

Stroke is the cerebrovasculer event in which sudden loss of neurological function caused by an interruption of blood flow to the brain, leads to cerebral infarct or a haemorrhage.1 The World Health Organization defined stroke, as rapidly developed clinical sign of focal or global disturbance of cerebral function, lasting more than 24 hours or leading to death, with no apparent cause other than of vascular origin. The post stroke disabilities occur primarily due to loss of locomotion, difficulty in Activity of Daily Living (ADL), cognitive impairment as a consequence of stroke.[3] Out of all motor impairments, approximately 85% of stroke patients have upper limb impairments.[4] Major disability following upper extremity impairment is loss of arm and hand function. After the onset of stroke there is disruption in the connection between the hand muscles and brain which leads to spasticity. Loss of all the hand function and difficulty in accomplishment of basic activities like straightening of the fingers, grip strength and grasping of the item makes them dependent for their basic activity of daily living. Thus, regaining optimum recovery of upper extremity and hand function is the prime goal of rehabilitation professionals.[5]

Traditional modes of intervention exist and are regularly practiced by the trained therapists in the form of constraint-induce movement therapy, task-oriented exercise, Proprioceptive neuromuscular training etc.

In order to overcome the constraints of existing rehabilitation models, there is exponential rise in the clinical utility of novel intervention therapies like Functional Electrical stimulation and mechanical devices like Saebo Flex with the aim to speed up the upper limb recovery following stroke.[6] Saeboflex provides low-load, long-duration stretches in the direction of the desired range of movement, while at the same time supporting the functional use of hand. The Saebo-Flex™ orthotic is a mechanical device, which enables an individual to open hand, pick up the objects and release during various tasks-oriented exercises. The device facilitating thumb and finger extension movements by recruiting voluntary thumb and finger flexor movement.[7] Training with Saebo Flex grasp and release activities, participants require only small range of active shoulder and elbow movement, with passive wrist extension to 15° with passive digit extension.[8] Functional electrical stimulation (FES) is the electrical stimulation of motor neurons through transcutaneous electrode which cause the muscle contraction and movement at the joint. Rehabilitation with Functional electrical stimulation consists of preprogrammed electrical stimulation of peripheral sensory and motor nerves with functional movement of the upper extremity, which enable the stroke survivors to regain functional arm motion. FES helps in cortical excitability in the lesion sensory motor cortex following stroke.[2] Present study conducted to explore the therapeutics effect of novel Intervention methods like FES and Saebo Flex on upper extremity recovery following stroke.

Methodology

The present study was randomized control trial in nature and Computer-generated random sampling method was used to allocate the participants into two groups i.e. Group A (Experimental Group) and Group B (Control Group). Participants of (Group A) received Saebo-Flex™ hand training, FES at extensor compartment of the forearm and conventional physiotherapy treatment, while participants of (Group B) received FES electrode placing at the extensor compartment of the forearm skin and conventional physiotherapy treatment. Treatment was given for 45 minutes/sessions x 5 sessions/week for 6 weeks.

Saeboflex assisted Task oriented Training is explained in appendix A.

Functional Electrical stimulation

Functional electrical stimulation was given with the programmable device designed to give electrical stimulation. Functional electrical stimulation included wrist and finger extensors/flexors transcutaneously by self adhesive surface electrode, during voluntary movement in order to elicit the extension of the wrist and fingers. FES parameters ranged 20-50 Hz frequency, with pulse width of 0-300 ms, peak current < 70 mA and duration of stimulation was 10 minutes.[2]

Conventional Physiotherapy Treatment

The standard Physiotherapy Treatment was given to the individual participants, the repetition and intensity of the exercises were guided by Research therapist based on the strength of the paretic limb of the participant. Modification in the progression of the Exercise was done the research therapist based on the performance of participant, with the aim to improve motor functions of paretic arm muscle.[6]

Control Group Intervention

Participants of the Control Group were receiving the Functional Electrical Stimulation with Conventional Physiotherapy intervention for 45 minutes, 5 sessions per week for 6 weeks similar to as given the Experimental Group participants. Before the commencement of the study, an ethical approval was taken from the Institutional Ethical Committee (IEC), Punjabi University, Patiala. Written consent was taken from all the selected individuals before the start of study. Baseline assessment was done using various outcome measures (Fugl Meyer assessment-upper extremity, Chedock arm and hand inventory programme, Nine-hole peg test, Grip strength and Pinch strength). Post Intervention assessment was done Day 12 and Day 42 using outcome measures. Data was collected and statistical analysis was done using SPSS 22 version.

Result

FMA-UE

The mean scores of FMA-UE for Group A and B were detailed in table 1 on Day 0, Day 12 and Day 42 respectively with $p \leq 0.05$ which depicts statistically significant results of Group A as compare to Group B.

CAHAI

It was observed that after 6 weeks of intervention there was increase seen in the mean scores of CAHAI for both the groups, their scores were explained in table 1 which indicates the significant difference between two groups.

Nine-hole peg test

The NHPT is used to measure the dexterity in individuals after the onset of stroke. It is found that the mean scores of NHPT for Group A and Group B were statistically non- significant results as shown in table 1.

Power Grip Strength

The mean scores of Power Grip Strength for Group A and Group B were statistically non-significant results in both groups.

Lateral Pinch strength

The mean scores of Lateral Pinch strength for Group A and Group B were statistically non-significant results in bothgroups.

Chuck Pinch strength

The mean scores of Chuck Pinch strength for Group A and Group B were statistically non-significant results. Here the $p \leq 0.05$ level of significance as their values shown in table 1.

Tip to Tip Pinchstrength

The mean scores of Tip-to-Tip Pinch strength for Group A and Group B were statistically non-significant results. Here the $p \leq 0.05$ level of significance as their values given in table 1.

Pulp Pinch strength

The mean scores of Pulp Pinch strength for Group A and Group B were statistically non- significant results. Here the $p \leq 0.05$ level of significance as their values shown in Table 1.

Table 1: Improvement in FMA-UE, CAHAI, NHPT, PG, LP, CP, TP and PP strength within Group A and Group B

Outcome	Group A			Group B			F Value		p Value	
Measures	Day 0	Day 12	Day 42	Day 0	Day 12	Day 42	Group A	Group B	Group A	Group B
FMA-UE	93.60± 9.89	105.50± 8.02	111.00± 7.72	92.10± 15.12	96.70± 14.90	100.50± 15.81	10.76	0.758	0.000	0.478
CAHAI	29.00 ± 6.38	35.00± 6.15	40.10± 5.57	23.00± 10.58	25.90± 11.74	28.50± 11.78	8.463	0.584	0.001	0.564
NHPT	273.20± 236.62	232.50 ±182.15	145.00 ±102.67	321.60± 283.55	187.10 ±128.55	215.00 ±179.77	1.291	1.170	0.291	0.326
PG	11.50 ± 9.32	14.00± 8.47	16.90± 7.92	6.70± 5.64	9.30± 6.17	11.40± 6.17	0.989	1.542	0.385	0.232
LP	3.00± 1.70	3.35± 1.97	3.80± 1.81	2.20± 1.40	2.50± 1.51	2.90± 1.29	0.479	0.628	0.624	0.541
CP	3.00± 1.49	3.80± 1.55	4.10± 1.29	2.30± 1.42	2.60± 1.51	3.00± 1.41	1.545	0.589	0.232	0.562
TP	1.95± 1.46	2.35± 1.63	2.90± 1.37	1.13± 0.96	1.55± 1.21	1.80± 1.23	1.021	0.881	0.079	0.531
PP	2.30± 0.95	2.80± 1.23	3.40± 0.97	2.00± 1.41	2.20± 1.55	2.50± 1.51	2.721	0.285	0.084	0.755

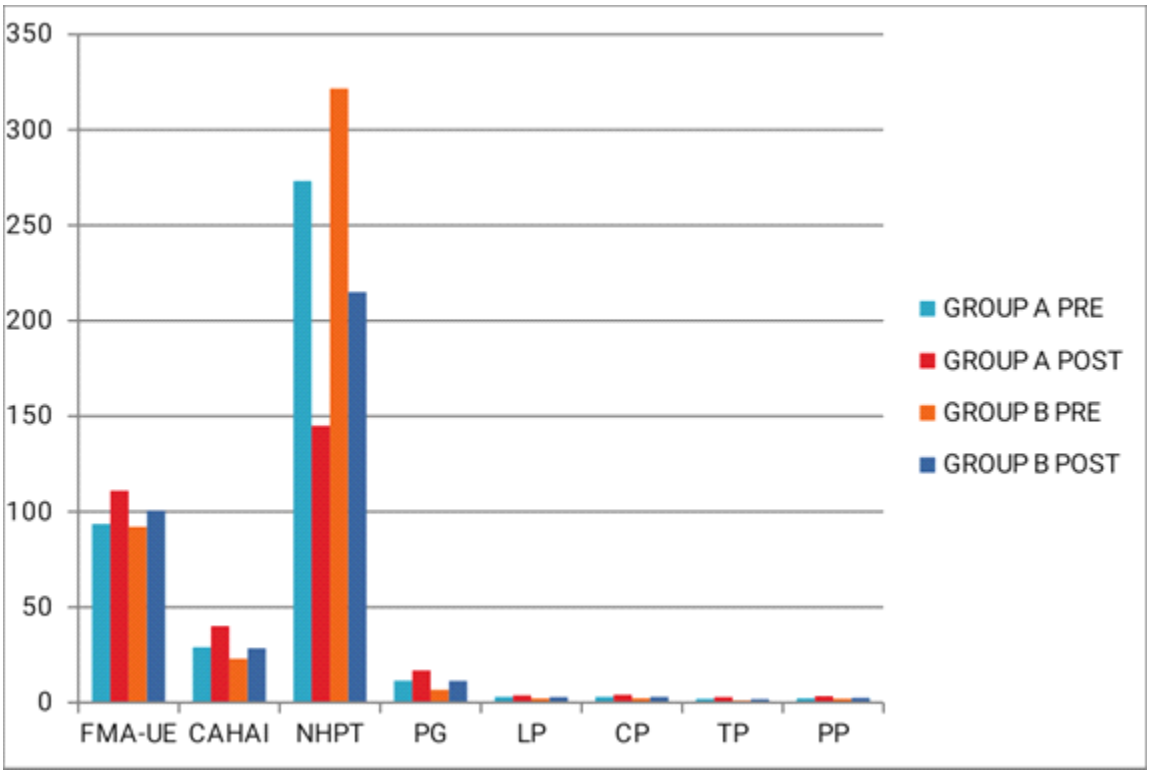

Figure 1: Improvement in FMA-UE, CAHAI, NHPT, PG, LP, CP, TP and PP strength within Group A and Group B

Discussion

The purpose of stroke rehabilitation training is to enhance arm-hand skill performance to make the best use of functional motor skill.[11] The current study find effect of Saebo- FlexTM device along with Functional Electrical Stimulation (FES) and conventional physiotherapy treatment on hand functions in sub acute stroke survivors was assessed using different scale as aforementioned as outcome measure at Day 0, Day 12 and Day 42 of the intervention. According to Frank who concluded that stroke survivors, who are in early sub-acute phase shows improvement in their performance of activity of daily living while doing rehabilitation training with the dynamic arm orthosis.[11] Although between group comparison of mean score value Day 0, 12, and Day 42 revealed statistical non- significant but clinically improvement was observed in the participant by increasing the mean scores value at Day 0, 12 and Day 42. The possible reason for statistical non significant result for the present study could be due to there were difference in terms of participant's age, gender and side of lesion (Lum et. al., 2002). The comparison of Mean difference in both the groups revealed that experimental group had more increase in FMA-UE scores than the control group.

The Chedock Arm and Hand Inventory programme was used to evaluate functional ability of affected upper extremity which indicated a significant improvement in CAHAI scores of experimental groups relative to that of control group. The NHPT in Group A and Group B were on comparisons of the mean scores were found to be non-significant ($p>0.05$) for both the groups, present study concluded that training with Saebo-FlexTM device along with Functional Electrical Stimulation (FES) and conventional physiotherapy treatment shows clinical improvement in hand dexterity in sub acute stroke participants. Post-stroke rehabilitation with Saebo Flex facilitated clinically significant improvement in arm hand function. Saebo Flex help in regaining the function of upper extremity in stroke survivors with moderate and severe upper limb weakness, particularly those unable to do active finger extension. Saebo Flex helps in keep the wrist and finger in extension position and help in grasp and releases activities.[12]

In Power Grip Strength results of the study showed that there has been an increase in mean values of power grip strength from Day 0 to Day 42 in both groups. The comparison of Mean difference in both the groups revealed that experimental group had more in power grip strength value than the control group. It can be concluded that training with Saebo-Flex^{TM} device along with Functional Electrical Stimulation (FES) shows clinical improvement in hand function in sub acute stroke. N.A. Lannin (2016) conducted the study on Saebo-Flex^{TM} for rehabilitation showed the loss in baseline recorded hand grip measurement over the study period and stated that use of the Saebo-Flex^{TM} is unable to help in regaining the strength of paretic muscles of hand early in post stroke and loss of strength may occurs during training protocol.

Improvement through Saebo-FlexTM in Pinch Strength (Lateral pinch, Tip to tip, Chuck pinch, and Pulp pinch) represent clinically significant reduction in the level of disability but improvement were not statistically significant.[6] This could be due to the limitation such as shorter duration of intervention. Saebo Flex only improves the gross motor function of the upper limb not show the much improvement in the fine activity of the hand. After the onset of stroke the survivors has a difficulty in voluntary opening of hand and loss of control of finger movements manifests as unable to move the single finger without moving other fingers of the hand at the same time. Post stroke there is neuronal hyperactivity and loss of reciprocal inhibition, which cause difficulty in independent movement of fingers face by the stroke survivors. Losing and difficulty in regaining individualization of fingers movements can also be explained by physiological basis of neural control of hand function. Motor cortex is able to controlling the individual finger movements as well as whole hand movements and in cortex there is no separate island of representation for each finger like other parts of body.[13]

Conclusion

The integrated intervention of Saebo-Flex^{TM} device along with Functional Electrical Stimulation can be used effectively to improve the upper extremity motor functions in sub acute stroke survivors.

Recommendations

Further research is needed for the use of Saebo Flex in acute stroke survivors' studies using larger samples size and follow up shall be done. In acute stroke survivors use of Saebo Flex the aim of increasing the use and repetition of early hand and upper limb movement before secondary complications become established.

Ethical Clearance: Taken from Institutional Ethical committee, Punjabi University, Patiala.

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Original Study

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Comparsion of the Effect on Balance Training with Foam Balance Activity and Tilt Board Exercise to Improve Fall Risk among Physically Active Chronic Knee Osteoarthritis Patients in Selected Places of Bengaluru

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Abstract

Background and purpose: Knee osteoarthritis is one of the most prevalent musculoskeletal complaints worldwide. Individuals with knee OA display impairments in knee joint proprioception. Reduced balance function is associated with an increased risk of falling. The aim of this study was to measure the balance between foam and tilt board training among physically active chronic osteoarthritis patients and to compare the effectiveness of balance training using proprioceptive tools like foam and tilt table among physically active chronic osteoarthritis patients.

Methods: This study included subjects between the ages of 40-70 years with chronic knee osteoarthritis and a body mass index of 30 and above. Subjects were recruited based on inclusion and exclusion criteria. It was a comparative study with 40 subjects divided into two groups of 20 each. Demographic data and other variables were collected and recorded and measures like VAS, WOMAC, Functional reach test and Berg balance scale were used.

Results: The foam balance activity group as well as the wobble board exercise group showed effective improvements clinically after the intervention. Comparison between groups did not show statistically significant improvement is any one over the other but clinically significant improvements were seen more in the wobble board exercise group.

Conclusion: The study concludes that the wobble board exercise group subjects showed clinically better improvements in balance and functional abilities when compared to the foam balance activity group subjects. Comparison between both groups did not show statistically significant improvement.

Keywords: Knee osteoarthritis; Balance; Foam balance; Wobble board.

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Introduction

Knee osteoarthritis (OA) is one of the most prevalent musculoskeletal complaints worldwide, affecting 30–40% of the population by the age of 65 years.[1] It is a major cause of impairment and disability among the elderly [2,3] and poses a significant economic burden on the community.[4] Individuals with knee OA suffer progressive loss of function, displaying increasing dependency in walking, stair climbing and other lower extremity tasks.[3] Balance is an integral component of these and many other activities of daily living.Balance is a complex function involving numerous neuromuscular processes.[5,6,7] Control of balance is dependent upon sensory input from the vestibular, visual and somatosensory systems. Central processing of this information results in coordinated neuromuscular responses that ensure the centre of mass remains within the base of support in situations when balance is disturbed. Effective control of balance thus relies not only on accurate sensory input but also on a timely response of strong muscles. Balance impairments are associated with an increased risk of falls and poorer mobility measures in the elderly population.[8,9,10]

Age-related impairments in balance and postural stability are well documented.[11.12.13] Ageing is associated with a decline in the integrity of the physiological systems that contribute to the control of balance.[6,14,15]

Control of balance is essential in all postures and situations, both static and dynamic. Postural sway is often used as an indicator of static standing balance [16-18] where bodily movement in both the antero-posterior (AP) and lateral direction is analysed, usually using force platforms. These expensive apparatuses are not readily available to the majority of clinicians, and are thus not appropriate for use in the clinical setting. Furthermore, falls and loss of balance most commonly occur during movement-related tasks such as walking [19, 20] and less frequently during static activities. It is therefore important that the evaluation of balance incorporates testing procedures that reflect the dynamic nature of such locomotor tasks, as static tests of balance are less able to identify individuals at risk of falls than dynamic tests [10, 21.]

Perturbation-based balance training is an intervention involving repeated postural perturbations aiming to improve control of rapid balance reactions. Perturbation/balance exercises have been shown to be well tolerated by Osteoarthritis (OA) knee clients and were also associated with improved pain, function, and balance. Also has been shown in studies on knee OA populations that the additive positive effects of kinesthesia and balance exercises increase their functional capacities. The exercise program for the training group comprised balance training standing on a wobble board for 9 weeks, twice a week. In all, 11 training group subjects and 11 control group subjects completed this study. After 9 weeks, standing time on a wobble board, standing time on a balance mat, and maximum displacement distance of anterior-posterior centre of pressure in the training group were significantly greater than those of the control group. These results suggest that wobble board training is effective for elderly people to improve their standing balance, by which they frequently control their centre of gravity and maintain a standing posture on unstable surface conditions.[22]

This study focuses on training for balance using proprioceptive tools such as foam balance and tilt board to improve the strategy for balance and minimizing fall risk in elderly population with chronic osteoarthritis. The present study aims to compare balance between foam and tilt board in chronic osteoarthritis patients to minimize the fall risk.

Methodology

Source of Data: The study will be conducted by recruiting physically active subjects of knee osteoarthritis.

Method of Collection of Data:

The data for the study will be collected based on the following categories:

- **Study setting:** RV College of Physiotherapy OPD and Community set up in Bengaluru.
- **Study subjects:** Chronic Knee osteoarthritis patients.

- **Study design:** Comparative study
- **Sampling technique:** Simple Random sampling
- **Study recruitment:** Community setup and OPD set up of RV College of Physiotherapy
- **Sample size calculation:** n=40, 20 subjects each arm.

Inclusion Criteria

- Subjects willing to participate and sign the written informed consent
- AGE: 40-70years
- Unilateral/Bilateral physically active OA patients of Chronic duration.
- Both Genders –Male and Female
- BMI of 30 or more than 30

Exclusion Criteria:

- Subjects with other diseases affecting quality of life (example: cancer, moderate to severe chronic renal insufficiency, chronic respiratory diseases, cardiovascular diseases including uncontrolled hypertension, diabetes) and the presence of severe cognitive, visual or hearing impairments
- Subjects who are terminally ill for which exercises would be contraindicated.
- Subjects use ambulatory device for walking
- Subjects with history of knee surgeries
- Subjects with history of intra-articular steroid injection (previous 6 months)
- Deformities of spine, hip and knee
- Recent soft tissue injury around knee joint
- Any neurological disorder

Materials Required

- Stationeries
- Consent form printouts
- Questionnaires print outs
    1. Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC)
    2. Berg balance scale (BBS)
    3. Functional reach test
- Weighing scale
- Stature meter
- Wobble Board
- Memory Foam Surface (48cm*40cm) – Rectangular in shape

Outcome Measuring Tools

1. Berg balance scale (BBS)
2. Functional Reach Test (FRT)

Procedure

For this study an informed written consent from the selected subjects was obtained after explaining the purpose of the study. The researcher recruited the subjects based on inclusion and exclusion criteria. Demographic data of the subjects was collected and recorded which included the name of the subject, age of subject and anthropometric measurement of height and weight to calculate body mass index. Initial evaluation for their pain profile using visual analogue scale (VAS) was recorded followed by Pre - test Western Ontario and McMaster Universities Arthritis Index (WOMAC) scores. This was taken by asking questions to the subjects about their pain, stiffness and functional independence. Pre and post-test balance scores were recorded using Berg balance scale (BBS) and Functional reach test.

Group A: Foam Balance Activity

Total subjects: 20

Exercises

1. Double-Leg Foam Balance Activity: Subject stands on a soft foam surface with both feet on the ground. Therapist attempts to perturb patient balance in random fashion.[23]
2. Single leg stance standing on dominant leg with non-dominant leg off the ground. [24]
3. The exercise to be repeated thrice for 30 seconds.
4. Medial lateral tilt with standing on both feet in the centre of the foam surface repeated 6 times.[26]
5. Balance with two legs, eyes open then eyes closed. [25]
6. Balance with both legs – Foam surface is placed near a wall. Then ask the patient to stand on it and just try to maintain the balance. [26]

7. Anterior posterior tilting – slowly tilt back and forth by hinging at the ankles and try to avoid bending at the waist. [26]
8. Tilt forward and backward with feet facing either corner of the foam surface. [26]

Frequency and Duration: 4 times a week for 4 weeks.[26]

Group B: Wobble Board Exercise

Total subjects: 20

Exercises : All the exercises were given as same as group A

Frequency and Duration: 4 times a week for 4 weeks. [26]

Result Analysis

The data collected for this study was entered in MS Excel, MS Word (2019).

The data collected for this study was analysed statistically in the following two ways: The data collected for this study was analysed statistically in 2 ways- descriptive and inferential statistics.Parametric student t test and non-parametric Mann-Whitney test was used within the groups based on verification normality assumption.

Table 1: Gender Distribution

Gender	Foam balance activity (Group A)	Wobble board exercise (Group B)
Male	2	4
Female	18	16
Total	20	20

Table 2: Mean and Standard deviation of Age, Body mass index and duration of work for both groups

	Foam balance activity		Wobble Board Exercise	
	Mean	SD	Mean	SD
Age (years)	59.15	10.74	50.45	8.60
BMI	31.63	1.75	32.05	1.44
Duration of Work (hours per day)	6.55	1.50	7.25	1.45

Table 3 and 4: Functional reach test and Berg balance scale scoring for both the groups

Foam Balance Activity	Pre-test		Post-test		t - value	P-value
	Mean	SD	Mean	SD		
Functional Reach Test (FRT in cm)	20.9	4.7	27.8	6.2	10.955	P < 0.001
Berg Balance Scale - BBS (Out of 56)	42.1	3.5	48.3	4.4	7.289	P < 0.001

Wobble Board Exercise	Pre-test		Post-test		t-value	P-value
	Mean	SD	Mean	SD		
Functional Reach Test (FRT in cm)	22.2	2.6	34.4	3.2	17.290	P < 0.001
Berg Balance Scale - BBS (Out of 56)	44.3	3.4	54.0	2.3	26.171	P < 0.001

Table 3 and 4: In the foam balance activity group, the functional reach test and berg balance scale score improvements did not show any statistical significance but functional reach test improved post-test. Both groups showed equally effective improvements pre-test to post-test and clinically, subjects showed great improvement with respect to ADL activities. Comparison between both groups did not show statistically significant improvement but the exercise regime intervention showed clinically significant improvement in both groups

Discussion

The present study was conducted to measure the balance between foam and tilt board training among physically active chronic knee osteoarthritis patients and to compare the effectiveness of balance training using proprioceptive tools like foam and tilt table among chronic knee osteoarthritis patients. The study groups included subjects between the ages of 40 and 70 years and with a body mass index of 30 and above. The variables of pain, function and

balance were assessed using the Visual analogue scale, WOMAC scores, Functional reach test and Berg balance scale. A total of 40 subjects had participated in this study after signing the informed consent form. They were assessed for the variables along with the demographic data collection and the findings were recorded.

A study was conducted which assessed the effects of wobble board balance training on physical function in institutionalized elderly people. The results suggested that wobble board training is effective for elderly people to improve their standing balance, by which they frequently control their centre of gravity and maintain a standing posture on unstable surface conditions.[26]

In this study the mean age for the foam balance activity group is 59.15, whereas for the wobble board activity group is 50.45, that is almost a nine years difference. This difference implies that the subjects of the foam board activity group being older might have more wear and tear of joints and greater balance impairments when compared to the subjects of the wobble board exercise group. This could have been a factor for better balance improvements in wobble board group clinically.

The mean body mass index of the foam balance activity group is 31.63 whereas of the wobble board exercise group is 32.05. Despite the fact that wobble board group subjects are more obese compared to foam balance group subjects, wobble board group subjects showed better clinical results and improvement in balance.

In this study, the mean hours of work per day for the foam balance group is 6.55 and of the wobble board group is 7.25. This shows greater hours of work among the wobble board group subjects. Even though this group was more physically stressed, they showed greater improvements in balance

The mean VAS score of the foam balance group subjects is 3.90 and that of wobble board group subjects is 3.50. The mean WOMAC score of the foam balance group is 34.75 and of the wobble board group is 32.85. This implies that the level of pain and functional impairments is higher in the foam balance activity group compared to wobble board exercise group and this could be a reason for better balance improvements seen clinically in the wobble board exercise group.

Limitations

- Secondary OA populations have been included, whereas, primary arthritic populations could have been included in the study
- Duration of study was limited to 4 weeks. Long term rehab could have been included to improve results.
- The study has considered a body mass index of 30 and above. It could have included 40 and above to include highly obese category to see better functional recovery among this population.
- The age distribution of subjects between both the groups could have been equally considered.

Conclusion

The objectives of the study were to measure the balance between foam and tilt board training among physically active chronic knee osteoarthritis patients and to compare the effectiveness of balance training using proprioceptive tools like foam and tilt table among chronic knee osteoarthritis patients.

The study concludes that the wobble board exercise group subjects showed clinically better improvements in balance and functional abilities when compared to the foam balance activity group subjects. Comparison between both groups did not show statistically significant improvement.

Conflict of Interest: There was no personal or institutional conflict of interest for this study

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Effect of Buteyko Breathing Technique on Haemodynamic Parameters and Functional Capacity in Subjects with Primary Hypertension

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Abstract

The Buteyko Breathing Technique (BBT) has been found to be effective in the treatment of Asthma, Obstructive Airway Disease and other diseases. Its effect on Hypertension has not been studied.

Aim and Objectives: To study the effect of Buteyko Breathing technique for 4 weeks on Hemodynamic parameters and functional capacity in subjects with primary hypertension.

Methodology: Parallel group study design in which 66 subjects from Hypertension OPD of Tertiary Health Care Centre were enrolled after taking their consent and Institutional Ethical approval. The subjects were randomly allocated to Control (N=33) (receiving standard treatment of care) and Experimental (N=33) (receiving Buteyko and standard treatment of care). Standard treatment of care included medication and educational videos on Hypertension, its complications and management. Buteyko Breathing Technique included supervised session of 30 minutes using a video once in a week for 4 weeks. Subjects were informed to perform these exercises at home daily.

Results: The experimental group showed a significant reduction in SBP (p=0.00), DBP (p=0.00), Resting HR (p=0.00) and a significant improvement in Control Pause (p=0.00) and 6MWD (p=0.00). There was a mean reduction in SBP of 8.6 + 6.31 mmHg (95% CI, 10.84- 6.36 mmHg) and in DBP of 4.606 + 4.34 mmHg (95% CI, 6.14-3.06mmHg).

Conclusion: Buteyko Breathing Technique has a positive effect on Haemodynamic parameters and functional capacity in subjects with Essential Hypertension.

Keywords: Hypertension; Buteyko Breathing Technique; slow breathing.

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Introduction

Cardiovascular diseases cause about 18 million deaths of about which 30% deaths are attributed to Cardiovascular diseases & Stroke. Amongst the common risk factor, Hypertension remains the leading cause of premature morbidity and mortality. Hypertension ranks third important risk factor attributing to the burden of cardiovascular diseases. Prevalence of hypertension in India has been reported as 33.8% in urban and 27.6% in rural areas with overall prevalence of 29.8%. According to the latest guidelines, Hypertension in adults is defined as systolic pressure greater than 140 mmHg and / or Diastolic pressure greater than 90 mmHg.[1,2]

Essential hypertension is high blood pressure in which secondary causes such as renovascular diseases, renal failure, Pheochromocytoma, Aldosteronism or other causal factors of secondary hypertension are not present. Factors like obesity, insulin resistance, high alcohol intake, high salt intake, aging, sedentary lifestyle, stress, low calcium intake and low potassium are associated with raised blood pressure.

Essential Hypertension is a chronic disease that requires long term self-management. Lifestyle modification strategies include alterations in eating behaviors like adopting the dietary approaches to stop hypertension (DASH), engaging in physical activity, reducing alcohol consumption, cessation of smoking and weight reduction. Dickinson HO, Mason JM and Nicolson DJ (2006) reported a reduction of 5 mm Hg and 3.7 mm Hg in Systolic BP and Diastolic BP respectively with dietary changes while increased physical activity and exercise reduced Systolic BP and Diastolic BP by 4.6 mm Hg and 2.4 mm Hg respectively. As can be seen both diet and exercises were equally effective and that a change of 5mm Hg was minimal clinically important difference noted for systolic blood pressure.

American Heart Association Guidelines 2017 state that 20% patients with Hypertension followed their treatment plans well enough to improve blood pressure whereas in India (National Indian guidelines of Hypertension, 2019), the levels of control of blood pressure was 20% in urban and 11% in rural areas.

As stated by Rosalba Courtney (2008) "The Buteyko Breathing Method is a unique breathing therapy that uses breath control and breath-holding exercises to treat a wide range of health conditions believed to be connected to hyperventilation and low carbon dioxide." This technique was developed by Dr. Konstantin Pavlovich Buteyko, a Russian physiologist. It aimed to "retrain" the breathing pattern to correct the oxygen and carbon dioxide levels in the bloodstream. According to Buteyko, chronic hidden hyperventilation on account of stressful lifestyle resulted in low carbon dioxide levels in the blood. This depletion of carbon dioxide affects the Krebs cycle, vital chemical reactions requiring carbon compounds and other key homeostatic processes in the cell. In order to retain the carbon dioxide, the body activates a series of defense mechanisms including constriction of airways and blood vessels, giving rise to conditions such as asthma and hypertension.[3]

There are numerous studies which have reported positive outcomes of Buteyko breathing in the management of Asthma, Anxiety disorders and Obstructive airway disease. A case series (2019) on Buteyko breathing method in subjects with COPD reported a mean reduction in systolic blood pressure by 4.16 ± 3.76mm of Hg and diastolic blood pressure by 5 ± 3.16mm of Hg and pulse rate by 2.5 ± 1.04/ minute following 2 weeks of intervention.4 Hence, this study aimed to evaluate the effect of Buteyko breathing technique on hemodynamic parameters and functional capacity in subjects with Hypertension.

Methodology

Outcome Measures Measured Pre and Post 4 weeks of Intervention:

1. Systolic (SBP) and Diastolic (DBP) blood pressure in mm Hg
2. 6 Minute Walk distance in Meters
3. Resting HR
4. Control Pause: Time in seconds required to hold a breath after an ordinary exhalation until the first urge to breath.

Control Group: Standard Treatment of Care

Standard Treatment of Care included medical management with antihypertensive medications and

patient education using a video. Patient education video included the following

a) Hypertension: what is hypertension, prevalence, complications, importance of medication and compliance to medications.

b) Lifestyle modification guidelines:

   i) Dietary Approaches to stop Hypertension (DASH):

   ii) Physical Activity: Walking at moderate intensity 20–25 min/day or 90-150 min/ week

   iii) Rest and relaxation.

   iv) Reducing alcohol consumption to 2 standard drinks per day.

Experimental Group: Standard treatment of care + Buteyko technique

In addition to Standard Treatment of Care, the subjects were given Buteyko Breathing. The subjects were seated in a chair with proper back support and were asked to adapt a good posture with relaxed shoulders and lower back.

Control Pause: Subjects were instructed to inhale a small breath from the nose and exhale through the mouth with pursed lips. At the end of normal exhalation, the subjects were made to hold the "out" breath by closing their nostrils with their dominant hand till the first urge to breathe in was felt.[9]

Slow breathing: Subjects were instructed to breathe **in and out** air gently by nose and continue slow nasal breathing at slow pace, best comfortable for him / her.

One set included 1 Control Pause and Slow breathing for 3min. Five sets followed by a rest period of 2 minutes and another 5 sets were performed in a single session.

Results

Data was analyzed using SPSS 16 software. Parametric t tests (paired and unpaired) were used for data passing normality and nonparametric tests (Wilcoxon Sign Rank and Mann Whitney U) were used. Ancova analysis was done for those variables that showed differences between groups at baseline. Effect size was calculated using Cohen's d. Statistical significance was set at 0.05.

Table 1: Baseline comparison between both groups

	Data	Control	Experimental	P
SBP (mmHg)	Mean	126.2 + 2.11	125.5+ 9.09	0.234
	Median	130.0	128.00	
	95%CI	118.9-133.9	122.2-128.6	
	SE	3.667	1.582	
DBP (mm Hg)	Mean	83.33 +1.08	82.909 + 8.03	0.637
	Median	82.00	82.00	
	95%CI	79.47- 87.18	80.06 - +85.75	
	SE	1.89	1.398	
Resting HR (Beats/min)	Mean	76.42 1.005	82.66 9.79	0.013
	Median	76.00	82.00	
	95%CI	72.86-79.98	79.19 – 86.14	
	SE	1.745	1.705	
CP (seconds)	Mean	26.87 6.57	22.06 + 6.80	0.002
	Median	25.00	21.00	
	95%CI	24.54 – 29.20	19.64- 24.47	
	SE	1.14	1.185	
6MWD	Mean	418.4 + 4.25	418.2 + 492.5	0.745
	Median	410.0	430.0	
	95%CI	399.7 – 429.9	401.0- 436.0	
	SE	7.399	8.574	

@ Mann Whitney test

unpaired t test

The above Table shows that there was a significant difference in Control pause (p=0.002) and Resting HR (p=0.013) between the groups at baseline.

Table 2: Pre and Post Comparison between groups

		Control Group		P	Experimental Group		p
		Pre	Post		Pre	Post	
SBP (mmHg)	Mean	126.4 ± 21.1	127.3 ± 9.78	0.36@	125.5 ± 9.09	116.9 ± 8.53	0.000#
	Median	130.0	128.0		128.0	118.0	
	95%CI	118.9-133.9	123.8-130.8		122-128.8	113.9-119.9	
	SE	3.677	1.702		1.582	1.485	
DBP (mmHg)	Mean	83.33 ± 10.8	80.36 ± 9.00	0.053@	82.90 ± 8.03	78.30 ± 6.32	0.000#
	Median	82.00	80.00		82.00	80.00	
	95%CI	79.47-87.18	77.17-83.55		80.06-85.75	76.05-80.54	
	SE	1.890	1.567		1.398	1.101	
Resting HR (beats/ minute)	Mean	76.42 ± 10.05	77.69 ± 9.85	0.290#	82.66 ± 9.79	74.84 ± 8.43	0.000#
	Median	76.00	78.00		82.00	73.00	
	95%CI	72.86-79.98	74.20-81.19		79.19 – 86.14	71.85-77.83	
	SE	1.749	1.715		1.705	1.467	
CP (seconds)	Mean	26.87 ± 6.57	27.36 ± 6.94	0.208@	22.06 ± 6.80	31.81 ± 8.38	0.000#
	Median	25.00	25.00		21.00	30.00	
	95%CI	24.54-29.20	24.90-29.83		19.64 – 24.47	28.84-34.79	
	SE	1.143	1.209		1.187	1.459	
6 MWD (meters)	Mean	414.8 ± 42.50	432.2 ± 44.5	0.000#	418.5 ± 49.25	435.1 ± 48.6	0.000@
	Median	410.0	430.0		430.0	440	
	95%CI	399.0-429.9	416.6-448.2		401.0-436.0	417.9-452.3	
	SE	7.399	7.74		8.57	8.46	

@ Wilcoxin Rank test

paired t test

The above table shows that there was a significant difference in the Experimental Group ($p<0.05$) as compared to the Control group.

Table 3: Comparison of the differences in both groups

Data		Control Group	Experimental Group	p
SBP (mmHg)	Mean	0.909 ± 20.4	-8.60 ± 6.31	0.00@
	Median	-2.00	-6.00	
	95%CI	-6.33 to 8.15	-10.8 to -6.36	
	SE	3.55	1.099	
DBP (mmHg)	Mean	-2.96 ± 8.26	-4.606 ± 4.34	0.003@
	Median	-2.00	-4.00	
	95%CI	-5.89 to -0.0397	-6.146 to -3.06	
	SE	1.43	0.756	

Data		Control Group	Experimental Group	p
Resting HR (beats/ minute)	Mean	1.27 ± 6.797	-7.818 ± 5.021	0.000#
	Median	1.00	-7.00	
	95%CI	-1.137 to 3.683	-9.598 to -6.037	
	SE	1.182	0.874	
CP (seconds)	Mean	0.484 ± 2.501	9.757 ± 5.67	0.000@
	Median	1.00	8.00	
	95%CI	-0.402 to 1.37	7.745 to 11.76	
	SE	0.435	0.987	
6MWD (meters)	Mean	17.57 ± 16.58	16.60 ± 15.12	0.000@
	Median	20.00	20.00	
	95%CI	11.69 to 23.45	11.241 to 21.970	
	SE	2.887	2.633	

Table 4: ANCOVA analysis of Resting HR and CP

	Source	Type III Sum of Squares	Df	Mean Square	F	Sig
Resting HR (beats/min)	Corrected Model	3639.199[a]	2	1819.599	61.044	0.000
	Intercept	282.086	1	282.086	9.463	0.003
	HR_PRE	3505.320	1	3505.320	117.597	0.000
	Groups	843.023	1	843.023	28.282	0.000
CP (seconds)	Corrected Model	2899.564[a]	2	1449.782	74.719	0.000
	Intercept	183.167	1	183.167	9.440	0.003
	CP_PRE	2572.155	1	2572.155	132.565	0.000
	Groups	1184.027	1	1184.027	61.023	0.000

The above table shows that the there was an overall statistically significant difference in post-intervention Resting HR and CP (post) between the different interventions (group) once their means had been adjusted for pre-intervention Resting HR and CP.

Discussion

Chacko N. Joseph et. al. in a study titled "Slow breathing improves arterial baroreflex sensitivity and reduces blood pressure in Essential hypertension" studied the effect of slow breathing on Blood pressure, RR interval and end tidal CO_2 in 20 hypertensive subjects and 26 controls in sitting position during spontaneous breathing and controlled breathing (at rate of 6 breaths/min and faster at 15 breaths/min). Baroreflex sensitivity was measured by autoregressive spectral analysis and alpha angle method. The study reported that slow breathing decreased systolic and diastolic pressure in Hypertensive subjects from 149.7 + 3.7 to 141.1 + 4mmHg and 82.7 + to 77.8 + 3.7mmHg respectively. It also increased baroreflex sensitivity (from 5.8 + 0.7 to 10.3 + 2.0m/s mmHg). It thus reported that hypertensive subjects tend to hyperventilate and that correction of hyperventilation could improve cardiovascular function.

Since, Buteyko breathing technique also incorporates slow breathing, this could probably explain the possible mechanism in lowering the BP and HR.

There have been a lot of studies conducted on Pranayam, Yoga which include slow breathing on blood pressure in primary Hypertension. But no such

study was conducted to study the effect of Buteyko breathing technique, which also contains slow breathing as an important entity of the treatment on the hypertensive subjects.

Buteyko Breathing Technique is a unique Breathing technique that uses breathing control (relaxation and slow breathing) and breath hold (control pause) exercises to retrain breathing in order to maintain carbon dioxide levels in the body.

Buteyko practioners believe that the mechanism of action of buteyko is its influence on the effect of Nitric Oxide (NO). Though O_2 and CO_2 are essential respiratory gases and are not directly linked to blood pressure, nitric oxide plays an important role in regulating blood pressure. NO which is unavailable in the atmosphere, is produced only in the paranasal sinuses. Nitric oxide is involved in number of physiological responses including Bronchodilation, Vasodilation, tissue permeability, immune response, oxygen transport,neurotransmission,memory and learning. Low levels of NO causes blood vessels to contract and raise blood pressure while higher levels of NO dilates blood vessels and lowers blood pressure.

Buteyko technique focuses on nasal breathing to have an effect on NO levels, as a large percentage of body's NO levels are made in paranasal sinuses. Buteyko breathing techniques maintain a steady high supply of NO as the breath holds (control pause) interspersed with slow breathing incorporated in technique influences on NO levels which produces widespread vasodilation, reducing the peripheral resistance and thus lower the blood pressure and heart rate.

Breath holding technique is shared by yoga and Buteyko few studies have been done on the therapeutic effects of breath holding. During a long breath hold such as the Maximum pause,one can see oxygen saturation dropping and then often reaching maximumsaturation of 100% when the first breath is taken. The face flushes,tight diaphragms relax, and people feel their breathing becomes free. One effect of long breath holds is that they enable the body to reverse carbon doxide gas exchange so that the body reabsorbs carbon dioxide. **(Hong, Rahn Kang, Song & Kang, 1963)**

Joulia F et. al. in the study "Breath hold training of humans reduce oxidative stress and blood acidosis after static and dynamic apnea" reported that repeated use of extended breath hold increases the body's production of endogenous antioxidants and raises the anaerobic threshold thus increasing capacity to exercise at higher levels of exertion, an effect similar to altitude or hypoxic training.

The research in Buteyko Technique has tested its effectiveness in treatment of Asthma, Chronic Obstructive Airway disease, Coronary Artery Bypass Grafting which showed improvement in physical, psychological health and quality of life. The study showed a significant reduction in Hemodynamic parameters and improvement in functional capacity in subjects receiving 4 weeks of Buteyko breathing technique.

Conclusion

Buteyko breathing technique has a positive effect on hemodynamic parameters and functional capacity in subjects with Essential hypertension.

Buteyko breathing technique uses a combination of breath holding post exhalation and slow breathing which in turn improves the autonomic regulation of BP and hence effective in subjects with hypertension.

Abbreviations

CP: Control Pause

HR: Heart Rate

SBP: Systolic blood pressure

DBP: Diastolic blood pressure

6MWD: Six Minute Walk Distance

%PV of 6MWD: % predicted value of six minute walk distance

NO: Nitric Oxide

Ethical Clearance: Sought from Ethics Committee for Academic Research Projects (ECARP)

Source of Funding: Self Funded

Conflict of Interest: None

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Descriptive Study

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Perception of the Parents of Physiotherapy Students about Physiotherapy Profession: A Descriptive Explorative Study

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Abstract

Background: Parental perception plays a vital role in the life of children including their academic , professional and personal lives. The study aims to identify the perception of the parents of physiotherapy Students about physiotherapy profession.

Method: A survey study with a Convenient sample of 200 will be carried out, The parents of all the students, that is 1st, 2nd ,3rd ,4th and interns of physiotherapy institute in Navi Mumbai will be included in the study. Following permission from the institute management, self -made validated questionnaire developed in light of related literature will be circulated by Google form to the participants with instructions. Outcome will be analysed statistically using MS Excel.

Conclusion: Based on the findings from study, it can be concluded that the majority of the parents have a positive perception of the physiotherapy profession and also are aware about physiotherapy field. The findings also suggest the need to stimulate the professional body of physiotherapy in India along with Indian physiotherapists to increase their efforts at creating awareness about physiotherapy.

The findings also help in navigating the barriers faced by physiotherapy students in various domains.

Keywords: Parents perception; Physiotherapy profession; Career.

Introduction

Physiotherapy plays a major role in rehabilitating a patient. The role of a Physiotherapist is to deal with application of physiotherapy skills & knowledge to the assessment, design, delivery & evaluation of physiotherapeutic treatments in the management of the various conditions of acute or chronic sickness, disability or handicap.[4]

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Physiotherapy is a science which incorporates a firm understanding of anatomy, physiology, disease and dysfunction, to provide intervention strategies for a variety of conditions notably, but not restricted to disabilities, pain, movement dysfunction, and health and wellness.[1,2]

Recently, there has been increased interest in the factors which influence the career choices of medical and allied health sciences professionals. Most studies have looked at the future aspirations and career intentions of medical students and postgraduates

Choosing a career is a complex process that can be influenced by many factors such as age, gender, race, socioeconomic factors, culture. Career choice must be preceded by an awareness of and knowledge of career.[4]

Lack of awareness and knowledge of physical therapy (PT) profession has been cited as a barrier to consideration of the profession as career option.[4,6]

Students enrolled in a physiotherapy program from all backgrounds were primarily influenced by family members or volunteer experiences when choosing career.[4,5]

This is also the case for the physiotherapy profession, which is chosen by students who are uninformed and unaware. In choosing a profession, students must build a balance between his/her family expectations and their own preferences. They must choose the field, in which they can do their best and satisfy their desires. For this reason, choosing the physiotherapy profession requires information, interest, desire, and talent. The choice of an occupation is an important decision, Their career choices depend on various factors such as funding, type of school attended, cultural factors, race, gender, job experience, personal factors, prestige, lifestyle preference, personality type, and commitment.[4]

It was also found that parental perceptions play a dynamic role in children's education with respect to academic performance, vocation choice and eventually influence behaviour of their children towards career choice. It was concluded from the literature search that parents had a strong influence over the career choice their children make, which can be both intentionally and inadvertently. Their influence can either inspire children to explore a diverse set of potential occupations or to stick to path they think their parents will approve.[7]

Materials and Methods

Sample population included were parents of physiotherapy students and sampling method was convenience sampling. Parents of undergraduate physiotherapy were included in this study. Total sampling size was 133 parents. Materials included were google form, self-designed questionnaire. This study was descriptive explorative study in nature employing quantitative methods in collecting the data. A A cross sectional survey was carried out using a voluntary, anonymous, self-administered questionnaire among sampled students from all 4 years.

Approval from an institutional review committee was obtained.

Participants were informed about the survey and questionnaire was circulated through Google form.

Questionnaire were categorized in five domains which are

1) professional and career

2) financial

3) social

4) Emotional and mental

5) Academic

A Likert scale was used to rate the participant's accuracy of the perception of the profession, the data obtained was then analyzed using MS Excel

Results

For this study, a questionnaire was develop to assess perception of parents of physiotherapy student about physiotherapy profession, a questionnaire of 16 questions under 5 domains were given to all participants along with their consent to be willing to participate in this study, a Likert scale were used to rate the participants' accuracy in their perception of the profession.

A total of 137 responses collected via google form. the result was obtained and analyzed through MS-Excel in the form of pie chart and bar graphs. The response of pie charts and bar graphs were as follows:

In professional and career domain

1. Which year of physiotherapy is your child in?

Majority of responses were from the parents of 4th year (31.9%) and 1st year (30.4%) students following intern (23.7%), 3rd year(12.6%) and 2nd year (1.4%).

2. How did you get to know about physiotherapy profession?

On getting to know about physiotherapy profession 42.6% responded to "other source" while 24.3% responded to "a close friend or relative in the same profession" and 24.3% responded to "have taken treatment from physiotherapist" and only 8.8% responded to "a guidance or occupational counsellor"

3. Have you been involved during the career decision making of your pupil?

The involvement of parents during the career decision making of their pupil is quite good with 35.3% "extremely involved" and 33.8% "quite involved" while 27.9% responded with "somewhat involved" and only 3% responded with "no involvement"

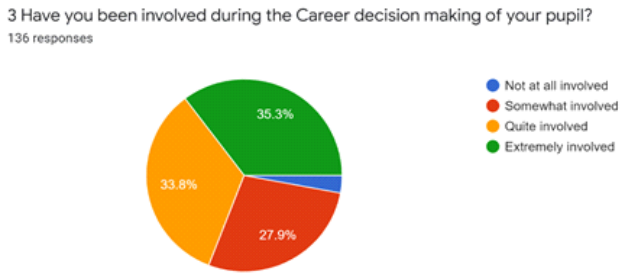

Fig. 1

4. To what extent have your ideas changed about physiotherapy profession since the start of your pupils physiotherapy profession ?

The extent of ideas of parents about physiotherapy profession since their pupils enrolment have changed with majority of parents responding "quite changed" 48.1% and "completely changed" 23.7% while 21.5% responded with "somewhat changed" and only 6.7% "not at all changed".

In social domain

5. Do you think there should be more awareness about physiotherapy in India?

An awareness about physiotherapy in India is important for the profession to grow , so does the majority of parents think with 76.5% responding "strongly agree" and 22.8% responding "agree" and only 0.7% "disagree".

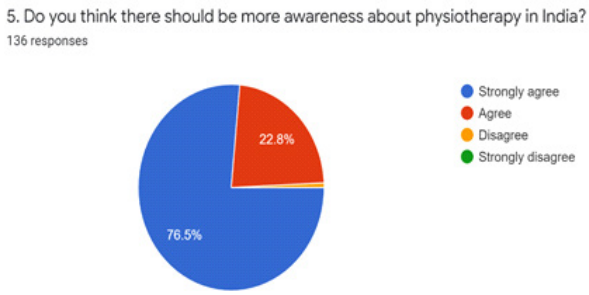

Fig. 2

6. Do you think physiotherapy is physically demanding profession?

Majority of parents agree that physiotherapy is physically demanding profession as responses 44.9% "strongly agree" and 55.9% "agree" while only 2.2% "disagree"

7. Do you think physiotherapy is a respectable job in India ?

Physiotherapy with its advancement in healthcare is one of the respectable job in India, Most of the parents responded with "strongly agree" 31.1% and "agree" 56.3% while 12.6% had "disagree".

Thus the result indicate a good social perception of parents of physiotherapy profession

Financial domain

8. Do you think physiotherapy profession pay well in India ?

Financial component is important aspect of a career and the growth of the profession Physiotherapy being a well paid job in India majority of the parents responded with "agree"47.1% while 43.4% had responded "disagree" following 5.3% "strongly agree" and 3.7% "strongly disagree".

9. Do you think physiotherapy career will provide economic stability to your child?

Many of the parents also thinks that physiotherapy career will provide economic stability to their child as most of them responded "agree" 77.2% and "strongly agree" 15.4% while only 7.4% responded "disagree"

10. How good do you think is the future job prospects of physiotherapy profession ?

According to the parents the job prospect of physiotherapy in India is "quite good" with 72.9% response and "extremely good" with 25.6% response while 1.5% think it is "somewhat good" and only 1% think "not at all good".

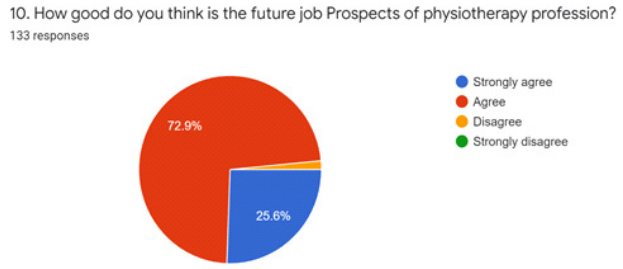

Fig. 3

Mental and emotional domain

11. Do you think the academic stress is affecting your child's overall health?

Mental health and well being can affect ones career and academic growth so as the profession can affect ones mental and emotional health.

Upon asking about the academic stress affecting their child's overall health majority of them "agree" with 54.4% response and 17.6% "strongly agree" while 25.7% 'disagree' and 2.3% "strongly disagree"

12. Do you think academic work takes most of your child's time and hence restricts them from enjoying other activities that they enjoy?

Most of them also think that the academic work takes most of their child's time and thus restrict them from enjoying other activities as 49.3% of parents responded with "agree" 21.6% responded "completely agree" while 26.9% have disagreed and 2.2% have "completely disagreed".

13. How often do you think your child worries about their future?(about the career)

On asking about how often your child worries about the future most of the parents responses were- "sometimes" 54.4% and "always" 37.5% while 4.5% responded "rarely" and 3.6% responded "never".

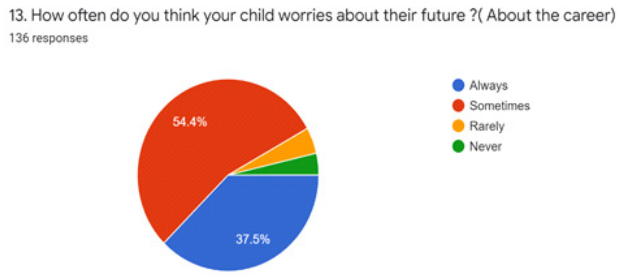

Fig. 4

Academic domain

14. Do you discuss your child's academic needs with them regularly ?

Upon asking about discussing their child's academic needs most of the parents responded with "sometimes" 58.1% and "all the time" 37.5% while only 4.4% said they don't get time

15. How aware are you about your child's academic and extracurricular achievements?

An awareness of child's academic and extracurricular achievements among the parents of physiotherapy students is good as 47.1% responded "to a great extent" and "somewhat" 46.3% while 4.7% responded "very little" and 1.9% "not at all".

16. Are you satisfied with your pupil's career choice?

The parents of physiotherapy students are quite satisfied with the career choice of their pupils with 76.5% responses to " totally satisfied" 22.8% responded to "somewhat" while only 0.7% responded to "very little".

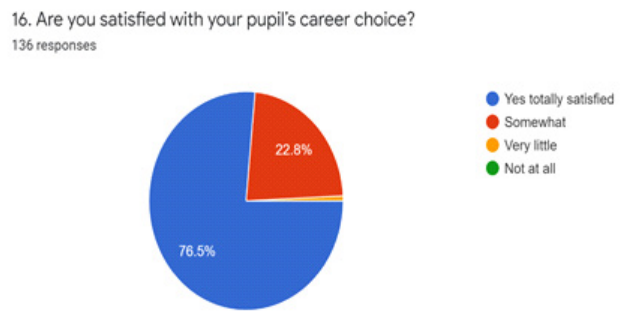

Fig. 5

Discussion

This study was done to assess the perception of the parents of physiotherapy students about physiotherapy profession.

The respondents were the parents of undergraduate students from YMT college of physiotherapy.

According to the results parents have a positive outlook of the profession and a better viewpoint of the profession, as they have become more aware about the profession.

Too little awareness and knowledge about the physiotherapy profession and the work physiotherapist do has been citied as a barrier, thus it reflects in the social domain as majority of parents finds the need of awareness.

To best of our knowledge, this is the first study conducted in india to assess parents perception about the profession.

Overall the parents are quite well versed with physiotherapy profession and all its aspects and are satisfied with the career choice of thier pupil.

Conclusion

Based on the findings from study, it can be concluded that the majority of the parents have a positive perception of the physiotherapy profession and also are aware about physiotherapy field. The findings also suggest the need to stimulate the professional body of physiotherapy in India along with Indian physiotherapists to increase their efforts at creating awareness about physiotherapy.

The findings also helps in navigating the barriers faced by physiotherapy students in various domains.

Conflict of interest: There is conflict of interest among the authors.

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Ethical clearance: It was obtained by research committee of YMT College of physiotherapy.

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Original Study

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Efficacy of Complete Decongestive Therapy Versus Pneumatic Compression Against Faradism Underpressure in Patients with Lymphedema Secondary to Breast Cancer

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Abstract

Introduction: Lymphedema is the most common secondary complication that people with breast cancer face. Characterized by the appearance of new growth. The new growth usually takes the shape of a lump which is frequently referred to as a neoplasm. Lymphedema in women who have had a mastectomy has the potential to become a chronic and progressive disorder. It is necessary to determine the impact of each strategy. The goal of this research was to investigate and evaluate the best treatment for lymphedema secondary to breast cancer.

Method: This study included 30 women with lymphedema caused by breast cancer. They were assigned to one of three groups. Group A (n=10) received complete decongestive therapy. Group B (n=10) received pneumatic compression, while Group C (n=10) received faradism under pressure. Subjects from all three groups were asked to come to the department three times per week for two months. Patients girth and pain intensity were measured pre and post treatment.

Conclusion: As a result, the researchers concluded that in patients with mild lymphedema, comprehensive decongestive therapy was more effective.

Keywords: Lymphedema; Complete decongestive therapy; Faradism under pressure; Pneumatic compression.

Introduction

Cancer is a disease that strikes all living creatures. There is no organ in the body that is immune to cancer.[1] CA-breast is the most commonly diagnosed cancer in women with 15% prevalence.[1,2]The development of new growth is the most evident aspect of many cancers.[1,2] The formation of newly created cells from normal body cells or their preceding development cells of origin is referred to as new growth or neoplasm. The new development typically

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forms a lump or tumour, which is commonly used interchangeably with the term neoplasm. Untreated malignant neoplasm or cancer that threatens the host's life. Chemotherapy, radiation therapy, medical care, surgical management, and other treatments are available for cancer. Mastectomy is one of the breast cancer surgeries.[1,3,5,6,7,8] Following breast cancer surgery, problems such as wound infection, seroma, pneumothorax, tissue necrosis, bleeding, harm to the axilla's neurovascular anatomy, and lymphedema may develop. One of the most common complications of Ca breast is lymphedema.[3,4,7] The accumulation of protein-rich fluid in soft tissue as a result of a disruption in lymphatic flow is known as lymph edema.[3,9,10] Lymphedema is a chronic, progressive, and frequently incapacitating condition.[7] Lymphedema in post-mastectomy patients has the potential to become a persistent and progressive condition.[7]

Lymphedema occurs when the lymphatic system's volume exceeds its transport capacity due to a functional overload.[6] As the illness worsens, it becomes resistant to treatment. Lymphedema can cause tissue fibrosis.[1,2,3] Deposition of protein-rich fluid in interstitial tissues causes it. This protein-rich liquid serves as a breeding ground for bacteria and fungi.[3,9,10] This could result in the affected limb being infected again. The status of lymphedema may deteriorate with each infection. [3,6,8]

Edema builds up over time if the lymphatic system is clogged or damaged, which can result in tissue thickening.[3,6,8] Limb enlargement, heaviness, mild discomfort, soreness, joint immobility, skin changes, persistent inflammation, and other complications of lymphedema can occur.[2,3]

The severity of lymphedema is usually graded. Soft pitting edema that improves with elevation and is free of clinical fibrosis describe Grade I. Nonpitting edema that does not improve with elevation and reveals the presence of fibrosis characterises Grade II. Hardening and hypertrophy of the subcutaneous tissues, as well as thickness and alterations in the skin, characterise Grade III. The duration of symptoms is linked to the severity of untreated arm lymphedema.[11] Massage, vigorous exercises, and faradism under pressure are among physiotherapy treatment options for lymph edoema.[2]

As lymph node injury is the primary cause of lymph edema, a better treatment method that focuses on lymph edema complications will be more successful than low frequency current and workouts alone. Faradism under pressure has been shown to be useful in treating Ca-breast lymph edema, however there is little evidence that biofeedback exercises combined with Faradism under pressure have a substantial impact on lymph edema. As a result, the effect of Faradism under pressure with biofeedback exercises in Ca-breast lymph edema was investigated.

The most widely established strategy for addressing Lymphedema symptoms is conservative therapy. Complete decongestive physiotherapy (CDP), Manual lymphatic drainage (MLD) alone, or sequential pneumatic compression are all options for conservative treatment. Manual lymphatic drainage, compression, skin care, and remedial exercises are all included in complete decongestive physiotherapy.[12]

Because the elastic fibres of the skin have often been injured, compression (bandaging the affected limb) is typically done following manual lymphatic drainage to prevent fluid reaccumulating. Lymphedema patients are taught how to support their skin's acidity through skin care regimens. Because Lymphedema is a protein-rich swelling, Lymphedema patients are at risk for fungal infections. Skin care regimes are an essential part of Complete decongestive physiotherapy. Remedial exercises are activities that the patient can do at home to help support the joint and muscle pump.

Manual lymphatic drainage is a sort of specialist massage that can be used in conjunction with or instead of Complete decongestive physiotherapy. Manual lymphatic drainage is used to move lymphatic fluid from areas of stagnation caused by damaged lymphatic vessels back into healthy lymphatic pathways.[13]

Practitioners that are skilled in the architecture and function of the lymphatic system, as well as massage techniques for moving lymphatic fluid, do manual lymphatic drainage. Manual lymphatic draining should be done slowly and lightly to avoid lymphangiospasm and to target the superficial tissues where the majority of Lymphedema occurs.

Manual lymphatic drainage or complete decongestive physiotherapy is usually done in two stages. The first phase's goals are to move the protein-rich fluid that has accumulated and to begin the decrease of fibrosclerotic tissue. Manual lymphatic drainage is normally done once or twice a day for around four weeks in this initial phase, which is commonly referred to as the therapeutic phase and is typically the phase studied in clinical trials.

Manual lymphatic drainage treatment can last anywhere from one to six weeks, depending on the severity of the condition. Patients are taught in the other components of the therapy if Manual lymphatic drainage is conducted as part of Complete decongestive physiotherapy (exercise, compressive therapy, skin care) during this preliminary phase.

Manual lymphatic drainage is only performed as needed during the second phase, often known as the maintenance phase. Patients are instructed to continue the other parts of Complete decongestive physiotherapy (compressive treatment, skin care, and remedial exercises) on their own during the maintenance phase if Manual lymphatic drainage is conducted as part of Complete decongestive physiotherapy.

As a result, while the Manual lymphatic drainage component of Complete decongestive physiotherapy is heavily utilised during the therapeutic or initial phase of therapy, making Complete decongestive physiotherapy more expensive in the beginning, Complete decongestive physiotherapy is ultimately designed for patients to become more self-sufficient over time, with Manual lymphatic drainage used only as needed.

The effectiveness of Complete decongestive physiotherapy has been reported in a number of case studies with varying reports on arm volume reduction from study to study.[14,15]

Megens went through the research literature to see how beneficial physical therapy is for Lymphedema management. This includes a review of the evidence supporting manual lymphatic draining. Overall, the findings appear to be positive; however, no comprehensive review of clinical trials using Complete decongestive physiotherapy or Manual lymphatic draining for Lymphedema related to breast cancer treatment has been done.[16]

Method

In this study of assessment of Girth measurement, Pain intensity and Range of motion of shoulder in patients with Lymphedema secondary to breast cancer . This study was conducted in Krishna Institute of Medical Sciences 'Deemed to be' University, Karad. An ethical clearance certificate was obtained by Institutional Ethical Committee of Krishna Institute of Medical Sciences 'Deemed to-be' University, Karad.Subjects who had Lymphedema secondary to breast cancer were selected. Subjects were chosen according to the inclusion criteria and exclusion criteria.

Inclusion Criteria

- Females.
- Age group 30 – 55 years
- Individuals with Lymphedema
- Individuals done with radiation and chemotherapy
- Individuals willing to participate.

Exclusion Criteria

- Individuals undergoing Radiation therapy
- Individuals undergoing Chemotherapy

An informed written consent was obtained from the subjects. An Assessment was performed using, VAS, ROM and Girth of affected limb measurement. Examination of pain is performed by VAS whereas examination ROM is taken by Goniometer. Similarly, for examination of Girth measurement patient is asked to sit and then the area of measurement is asked to expose and measure is taken from distal to proximal with difference of 3 or 4 inch in every measurement.

The treatment was given in three groups. Group A was given Complete decongestive therapy (Manual lymphatic drainage, Bandaging, Exercise). Group B was given Pneumatic compression. Group C was given Faradism under pressure.

Results

Demographic variables

Age wise variation

Table 1: Complete decongestive therapy

30-35	3	20%
36-40	2	30%
41-45	0	0%
46-50	3	20%
51-55	2	30%

Interpretation: There were three patients between the ages of 30 and 35. Two patients between the ages of 36 and 40 took part in the study. There were three patients between the ages of 46 and 50. Two patients between the ages of 51 and 55 took part.

Table 2: Pneumatic compression therapy

30-35	3	30%
36-40	2	20%
41-45	0	0%
46-50	3	30%
51-55	2	20%

Interpretation: There were 3 patients of age group 30 – 35 yrs**.** 2 patients of age group 36-40 yrs participated. There were three patients of age group 46-50 yrs. 2 patients of age group 51-55 yrs participated.

Table 3: Faradism under pressure therapy

30-35	0	0%
36-40	2	20%
41-45	2	20%
46-50	1	10%
51-55	5	50%

Interpretation: Patients aged 36-40 years and 41-45 years participate at a rate of 20%. In the age group 46-50 years, the figure is 10%. In the 51–55yrs old age group, 50% of patients participate.

Discussion

CA-breast is the most commonly diagnosed cancer in women with 15% prevalence.[1,2]

The new development typically forms a lump or tumour, which is commonly used interchangeably with the term neoplasm. Untreated malignant neoplasm or cancer that threatens the host's life.

Following breast cancer surgery, problems such as wound infection, seroma, pneumothorax, tissue necrosis, bleeding, harm to the axilla's neurovascular anatomy, and lymphedema may develop. One of the most common complications of Ca breast is lymphedema.[3,4,7]

The severity of lymphedema is usually graded. Soft pitting edema that improves with elevation and is free of clinical fibrosis describe Grade I. Nonpitting edema that does not improve with elevation and reveals the presence of fibrosis characterizes Grade II. Hardening and hypertrophy of the subcutaneous tissues, as well as thickness and alterations in the skin, characterize Grade III. The duration of symptoms is linked to the severity of untreated arm lymphedema.[11]

This study 'Efficacy of complete decongestive therapy versus pneumatic compression against faradism under pressure in patients with lymphedema secondary to breast cancer.' was conducted to find out effectiveness of various treatment protocol on patient's lymphedema. Previous literatures shows that there is positive effect of pneumatic compression when interchanged with manual lymphatic drainage.

In previous study 30 individuals were taken and they were distributed in group of two. One group was given complete decongestive therapy treatment while the second group was given pneumatic compression other than manual lymphatic drainage. There was more effectiveness observed in group that underwent pneumatic compression interchanged with manual lymphatic drainage in complete decongestive therapy. In previous study 30 individuals were taken and they were divided in two groups those were given faradism under pressure and one was given faradism under pressure along with exercise.

In this study three groups were made one group was given complete decongestive therapy and the second group was given pneumatic compression therapy and third group underwent faradism under pressure and all the group were asked to do mobility exercise to increase range of motion and to reduce lymphedema. Women ranging in age group

of 30 to 55 were participating and the one who had lymphedema secondary to breast cancer.

Women who had undergone chemotherapy and radiation therapy were asked to participate in this study. At the end patients were more benefited with complete decongestive therapy in comparison to pneumatic compression and faradism under pressure. Range of motion was mildly affected in patients with mild reduction in lymphedema there was a noticeable change in range of motion in some patients.

According to age distribution there is maximum distribution of women ranging from age 51 to 55 yrs who had complication of lymphedema secondary to breast cancer.

In the present study the pre- intervention Mean and Standard deviation of girth in Complete decongestive therapy was 9.319 (3.475969) where as post intervention value of girth in Complete decongestive therapy was 9.197 (3.492458). It concluded that interference was considered very significant with P value <0.0001.

In the present study the pre-intervention Mean and Standard deviation of girth in Pneumatic compression was 9.41(3.61) where as post intervention value of girth in Pneumatic compression was 9.22(3.65). It concluded that interference was considered very significant with P value <0.0001

In the present study the pre- intervention Mean and Standard deviation of girth in Faradism under pressure was 9.39(3.47) where as post intervention value of girth in Faradism under pressure was 9.19(3.49). It concluded that interference was considered very significant with P value <0.0001.

In the present study the pre-intervention Mean and Standard deviation of VAS in Complete decongestive therapy was 6.7(1.53) where as post intervention value of girth in Complete decongestive therapy was2(0.77).It concluded that interference was considered very significant with P value 0.0012.

In the present study the pre-intervention Mean and Standard deviation of VAS in Pneumatic compression was 3.9(0.94) where as post intervention value of girth in Pneumatic compression was 2(0.44). It concluded that interference was considered significant with P value 0.0186.

In the present study the pre- intervention Mean and Standard deviation of VAS in Faradism under pressure was 4.6(1.49) where as post intervention value of girth in Faradism under pressure was 2.3(0.78)).It concluded that interference was considered significant with P value 0.0329.

Conclusion

There was a significant change in lymphedema in patients who underwent complete congestive therapy, followed by the patients who had pneumatic compression therapy and then were the patients who were treated with faradism under pressure. Therefore, the study conclude that the complete decongestive therapy was more beneficial in patients with mild lymphedema secondary to lymphedema.

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Comparative Study

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Effect of Task Oriented Training with Conventional Therapy and Conventional Therapy Alone in Hemiparesis: A Comparative Study

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Abstract

Background: Independency for basic self handling is the primary want of every human. Impaired upper extremity functional movements due to stroke followed by hemiparesis leads to poor participation in daily living activities.

Objective: To determine and compare the effectiveness of Task Oriented Training (TOT) with Conventional Exercise Program (CEP) and Conventional Exercise Program alone in hemiparetic post stroke patients for improving functional performance.

Method: 24 subjects with post stroke hemiparesis were assigned into two groups (12 in each group). The outcome measure was Fugl- Meyer assessment scale (FMA) and Wolf motor function assessment scale (WMFA). Group A subjects were treated with conventional therapy only while group B subjects were treated with Task Oriented training. The intervention was provided to both the groups for 5 times a week for a total duration of 8 weeks.

Results: The results demonstrated significant improvement in functional ability for subjects of group B in comparison to group A ($p<0.05$) whereas sensorimotor function doesn't significantly improved with Combination treatment (CEP+ TOT).

Conclusion: The results shows that CEP along with TOT are effective in decreasing dependency in self care activities by increasing functional ability of patients. Therefore, Task oriented training with conventional exercise program can be practiced in physiotherapy for management of hemiparesis.

Keywords: Conventional therapy; FMA; Functional ability; Hemiparesis; Stroke; Task Oriented Training; WMFA.

Introduction

Hemiplegia is complete paralysis of half of the body and hemiparesis or unilateral paresis is, in its less severe form, loss of motor skills of one entire half of body. CVA (also known as Stroke) results from cerebrovascular insult and characterised by immediate loss of neurological function which is followed by hemiplegia in acute stage and hemiparesis in sub-acute and chronic stages.

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Post stroke patients sustained several impairments such as motor, sensory, communication, respiratory, reflex activity, emotional disorders, and functional limitations.[1] As a result, the survivor faces poor Health related quality of Life, low life participation and long-term disabilities.

One of the major functional difficulties after stroke is impaired upper extremity function and only 5% of affected population recoup the full functioning of hemiparetic arm.[2] This will affect the performance of daily living activities and lessen the sufferer's healthy life years and functional wellbeing. The approximated accommodated proportion of prevalence in India is 84-262/100,000 in rustic and 334-424/100,000 in civic areas.[3]

Rehabilitation for post stroke patients continues to be highly variable in terms of programs and duration. Stroke rehabilitation should begin immediately after the patient is declared medically stable. The plan of care must include short term and long-term treatment goals. The specific patient's neurological condition needs different appropriate intervention in order to decrease disability and promoting functional independence. This intervention may be CIMT (constraint induced movement therapy), mirror therapy, motor imaginary training, PNF (proprioceptive neuromuscular facilitation), Neurodevelopmental technique (bobath), Electrical stimulation, TOT (task-oriented training), biofeedback, etc for improving function of paretic arm.

Task oriented training is a therapeutic approach which is intended to acquire a skill by doing a specific given challenging task in repetitive manner. This strategy is based on proposition of motor learning, motor control and neuroplasticity. Unlike general repetitive training which is a bottom-up[4] approach the task-oriented intervention is a top-down[5] approach and it must include goals that involves active participation, meaningful tasks, and purposeful movements in order to upgrade daily life operating abilities.

Numerous approaches are used to improve function of post stroke hemiparetic limb, still due to some practical issues like lack of interest, financial burden, time consuming, lack of understanding of treatment etc., significant improvement is not attained but TOT in contrast have no such issues as it is interesting, low cost, time efficient and easily understandable.

Previous studies have reported much evidence in support of effectiveness of conventional exercise program to enhance positive response in management of post stroke patients. This study purposed to examine the effectiveness of combined task-oriented training and conventional exercise program on upper extremity functional performance in post stroke patients as this intervention is still in confliction.

Methodology

The study was an experimental comparative study of 8 weeks with each session of 1 hour. It was conducted at shri ram hospital, New Delhi and Singh physiotherapy clinic, New Delhi. Ethical clearance was given by institutional ethical committee, Jaipur physiotherapy college, Rajasthan. Simple random sample of 24 post stroke subjects with stable medical condition, age ranging from 40-60 years, both genders, had post stroke period from 1 month up to 1 year, fugl-meyer assessment score between 19-50 were included in the study. Patients with any other neurological disease, poor cognition, any musculoskeletal deformity, recent fracture, shoulder subluxation, visual deficit, and uncontrolled hypertension were excluded from the study.

Procedure

24 subjects after meeting inclusion and exclusion criteria were randomly assigned to two groups. Complete explanations were given to both the groups singly but subjects were unaware of which group they referred. "Group A" included 12 patients. After assessment and calculation of pre intervention score, subjects received Conventional exercise program for 1 hour each day for 5 days in a week for 8 weeks (Total 40 sessions). This intervention focused on increasing range of motion, improving strength and co-ordination of hemiparetic upper limb. The treatment protocol for this group was arm and elbow isometrics in supine lying with hold of 10 seconds for 10 repetitions for 4 weeks and 15 repetitions for next 4 weeks. Arm raises with clasped hands, turns to affected and sound side one by one with clasped

hands, straight push with clasped hands were performed in high sitting position, repeated for 10 repetitions for first 20 sessions and progressed to 15 repetitions in next 20 sessions.

Bridging was performed as patient was lying supine with feet flat on couch, both knees bent and arm straight, palm facing downwards. Patient was asked to lift up the waist and hold the position for 10 seconds for 10 repetitions. Prone on hands was done as the patient was lying on stomach with hands directly under shoulders. Patient was asked to lift the head slowly to face the ceiling and hold the position for 10 seconds for 10 repeats. Stretching exercises for biceps brachii,wrist flexor, finger flexor and pectorals was done to passively by therapist to increase Range of motion. Active assisted sit to stand transfer followed by self assisted sit to stand, then followed by active transfer (sit to stand), Active pumping exercises for wrist by using squeeze ball. Finger to nose and finger to finger exercises were performed to improve coordination.

Group B includes 12 patients, allocated to conventional exercise program of group A in combination with task oriented training. Each patient was assessed for calculation of pre intervention outcomes score. Intervention was given for 5 days in a week for 8 weeks (Total = 40 sessions) for 1 hour per day out of which 10 minutes were given to warm up exercises. This intervention focused on repeating meaningful tasks that were selected according to patient's need or preference. Sitting was the selected position while performing tasks. 2 minutes of rest provided to patient after completion of each task. Every task was demonstrated by therapist before patient performs the same. The task opted were moving pegs, drinking water from glass, combing hair, pouring water from one cup to another, polishing table with towel with elbow in extension, piling up cones, passing loops through curvy pipeline, throwing tennis ball.

Progression of intervention program is done by increasing sets and repetitions. Verbal, visual or proprioceptive feedback was also provided timely to the patient to make sure that the patient had performed task timely and precisely. Re-evaluation of outcome measures was done after 8 weeks.

Statistical Analysis

Comparative Statistical analysis was performed using graphpad prism software. Level of significance with p value <0.05 significant result and < 0.001 proves highly significant result.

The post intervention outcome measures within the same group were compared by using paired t-test' and the measures between control group and experimental group were tested for effectiveness by 'unpaired test'.

Results

Table 1: Baseline Data of Demographic Variables

Demographic Variables	Control Group	Experimental Group
Age	63.25 ± 8.44	64.83 ± 7.01
Side(R/L)	7/5	6/6
Gender(M/F)	8/4	8/4

Table 2: Control Group/ Cep (Intragroup Comparison)

Outcomes	Pre-Intervention	Post-Intervention	Mean Difference	t-value	p-Value	Result
FMA	27.25 ± 4.13	29.66 ± 4.14	2.41 ± 0.66	12.52	<0.001	Highly Significant
WFMA	35.58 ± 4.20	40.66 ± 4.67	5.08 ± 1.31	13.43	<0.001	Highly Significant

Table 3: Experimental Group/Tot (Intragroup Comparison)

Outcomes	Pre-Intervention	Post-Intervention	Mean Difference	t-value	p-Value	Result
FMA	27.08 ± 4.48	31.5 ± 4.29	4.41 ± 1.08	14.12	<0.001	Highly Significant
WFMA	38.25 ± 2.56	49.08 ± 3.17	10.83 ± 2.88	13	<0.001	Highly Significant

Table 4: Inter-Group Comparison

Outcomes	Control Group	Experimental Group	Mean Difference	t- value	p-Value	Result
FMA	29.83 ± 1.07	31.5±1.24	1.667±1.662	1.003	>0.05	Insignificant
WFMA	40.67±1.35	49.08±0.91	8.41±1.632	5.157	<0.05	Significant

Discussion

The present study investigated the effect of combined task oriented training and conventional exercise program versus the effect of conventional exercise program alone. Total 24 patients were included in the study, in that group A (CEP group) had 12 patients, and Group B (TOT group) had 12 patients. Initial baseline data was taken and compare with final data for both the control and experimental group. Baseline data of demographic variables did not show any statistical difference between patient population in two given groups.

The results of present study indicates improvement in both the group in terms of pre and post FMA and WMFT scoring, whereas, in inter group comparison only WMFT scores showed considerable difference.

For 11 degree of freedom at 5% level of significance, the 't' value of FMA score in control group was 12.52 and p- value was <0.001 which proved highly significant difference. The calculated t-value for WMFA measure in control group was 13.43 and p- value is <0.001 which reported highly significant difference .The 't' value of FMA score in experimental group for 11 degree of freedom and 5% level of significance was 13 and p value is <0.001 which indicates highly significant difference. The calculated 't' value of WMFA score for same degree of freedom and level of significance in experimental group was 13 and p value is <0.001 which indicates highly significant difference.

For 22 degree of freedom, the inter-group comparison result of both the groups reported no significant difference in FMA scoring as the calculated 't' value is 1.003 and p value is 0.326 which is greater than 0.05 while in WMFA scoring, the calculated t-value is 5.157 and p value is <0.05which showed significant difference in control group and experimental group.

Patients in the control group were treated with upper limb strengthening, stretching and coordination exercises for 8 weeks. The mean difference in pre and post FMA was 2.41±0.66 ($p<0.05$), and the mean difference in pre and post WMFT scores was 5.08 ± 1.311 ($p<0.05$) , that concludes significant difference. The results showed that there is statistically significant improvement in all outcome measures seen in group A on intra- group comparison.

The result could be due to improvement in neural activation, and muscle structure and function which in turn leads to gain in strength. Juo-o-kim,2017[6] noted enhancement in balance, gait ability and ADL in hemiplegic post stroke patients after 4 weeks of upper extremity co-ordination exercises. Ehsan ghasemi (2017)[7], reported improvement in functional outcomes such as modified as timed up and go

test and timed 10-meter walk test after functional stretching exercises.

Patients in this group were treated with conventional exercise program along with task-oriented training for 8 weeks. The mean difference in pre and post intervention FMA scores was 4.41 ± 1.08 ($p<0.05$) , and the mean difference in pre and post WMFA scores was 10.83 ± 2.88 ($p<0.05$). The given analysis concludes significant difference in both outcome measures seen in group B on intra comparison.

The critical part of functional recovery is adaptation to environmental changes. In reference to this, instead of single muscle activation pattern[8], patients are helped to learn various ways to solve task. Task oriented training works on the concepts of neural plasticity. This mechanism is believed to be useful for motor learning in intact brain and also for relearning in damaged brain.

According to AA Thant[9], the task-oriented training is more useful than conventional exercise program for improving functional performance of paretic upper extremity in sub acute stroke sufferers. Sneha s. Khandare[10] 2013, have suggested that mirror therapy can be added along with task-specific in treatment of sub-acute stroke patients to improve upper limb function.

Task specific training is considered effective in preventing post stroke secondary complications and also in improving the patient's general health through changes in physical activity levels[11]. Khander almhdawi (2011)[12], reported that task-oriented approach is an effective upper extremity post stroke intervention in improving functional abilities of upper limb. It is commonly known that, drill like training programs and intervention which focused mere repetition to a movement problem are less effective than practice of problem solving training programs.[1]

Limitations

The study was short term and done with smaller sample size with an unequal distribution of males and females in this study. Further studies can concentrate on large number of subjects with equal distribution of male and female and duration of study can be prolonged with more follow ups.

Conclusion

Among post- stroke upper extremity hemiparetic patients, use of task-oriented training with conventional exercises program did not significantly improved sensorimotor function of upper limb as fugl-meyer assessment scale results has shown insignificant difference in inter-group comparison, while functional ability has improved more with the use of combination therapy of task-oriented training and conventional exercises in comparison to conventional exercise program alone as WMFA results has shown significant difference.

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Cross Sectional Study

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Prevalence of Work Related Psychological Stress and Work Ability among Nursing Students: A Cross Sectional Study

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Abstract

Background: Nursing is seen as an apparently stressful occupation, as nurses assume the role of caregivers and supervisors for their patients and also become role models and educators for their families and working environment. Nursing students don't differ from other category of students as they actually experience more stress when compared with them. One of the reasons of experiencing more stress by nursing students is that majority of them are younger and middle-aged group. A high level of occupational stress has been found to reduce nursing quality and working ability. So, the aim of this study was to find the prevalence rate of work related psychological stress and work ability among nursing students.

Method: A short form questionnaire was prepared which consisted of survey related questions from Perceived Stress Scale and Work Ability Index. Total 101 nursing students were selected on the basis of selection criteria and the questionnaire was distributed amongst them. Data analysis using scientific calculation showed that there was high prevalence rate of moderate level of perceived stress among nursing students but their working ability was excellent in context with their physical and psychological demands.

Conclusion: There was significant prevalence rate of work related psychological stress but working ability was not so much affected among nursing students.

Keywords: Perceived Stress Scale; Work Ability Index.

Introduction

Nursing, the biggest health care profession, may be defined as a process of action, reaction, interaction and transaction in which nurses provide health care to the patients and then become affected by complex interactive factors including social, cultural, economic and political situations.[1] It has been widely reported that musculoskeletal disorders (MSD) and psychological stress are significantly prevalent and most common health complaints in health care

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workers and especially in hospital staff, nurses and physical therapists.[2-12]

Stress has become one of the important factors influencing individual efficacy and satisfaction in modern-day hospital settings. Stress is a state which affects the mind and body. Environmental events or social situations that have the potential to induce stress are known as 'social stressors'.

Occupational stress may be defined as a situation wherein job-related factors interact with an employee, changing his/her psychological and physiological condition in a way that the person is forced to deviate from normal functioning. The WHO defines occupational stress as 'the physiological and emotional responses that occur when workers perceive an imbalance between worker's effort and associated reward'.

A high level of occupational stress has been found to reduce nursing quality. Several studies concluded that nurse workload and nurse health indicators are key factors that must be addressed in effective workplace, health promotion & recruitment and retention strategies.[13,14]

Bernburg et al.[15] defined work ability as "the sum of factors enabling an employee in a certain situation to manage his/her working demands successfully" or defined as the balance between the employee's/ individual's resources and the work demands.

Perceived Stress Scale (PSS): PSS is the most widely utilized psychological tool for measurement of perception of stress. It is a measure of the degree to which situation in one's life are considered as stressful. Items are designed to show how unpredictable, uncontrollable and overloaded participants find their lives. The scale also includes a count of direct queries about current levels of experienced stress. The items are easy to comprehend and the response alternatives are simple to grasp. The questions in the PSS ask about emotions and thoughts during the last month. In each case, participants are asked how often they felt a certain way.[16,17]

Work Ability Index (WAI): WAI is a tool used in clinical occupational health and research to assess work ability during health examinations and workplace surveys. The index is determined on the basis of the answers to a series of questions which take into consideration the demands of work, the worker's health status and resources.[18-21]

Materials and Method

Study Design: A Cross-Sectional study

Study Population: Nursing students

Study Setting: Nursing Colleges in Vadodara

Sampling Design: Convenience sampling method

Sample size: 101 students

Inclusion criteria:

- Age group - 19 to 24 years
- Gender - both male and female
- Students having nursing clinical exposure for atleast 5 hours
- Students showing acute signs of health related dysfunction and psychological stress
- Students who are able to comprehend commands
- Willingness to participate in the study

Exclusion criteria:

- Students suffering from chronic health disorders like early osteoarthritis, hyperglycemia, cardiopulmonary disorders, thyroid dysfunction etc.
- Students suffering from major psychological ailments like schizophrenia, dementia etc.
- Any previous trauma, surgery or infection anywhere in the body.

Materials used:

- Perceived Stress Scale (PSS)
- Work Ability Index (WAI)

Outcome Measures:

1) Perceived Stress Scale (PSS)

- PSS is the most widely utilized psychological tool for measurement of perception of stress.
- It is a measure of the degree to which situations in one's life are considered as stressful.
- Items were designed to tap how unpredictable,

uncontrollable and overloaded participants find their lives.

- The scale also includes a count of direct queries about current levels of experienced stress.
- The items are easy to comprehend and the response alternatives are simple to grasp.
- The questions in the PSS ask about emotions and thoughts during the last month.
- Scoring: PSS scores are obtained by responses (e.g. 0 = 4, 1 = 3, 2 = 2, 3 = 1 & 4 = 0) to the four positively stated items (items 4, 5, 7 & 8) and then summing across all scale items.
- Individual scores on PSS can range from 0-40 with higher scores indicating higher level of perceived stress:

  a) Scores ranging from 0-13 will be considered low stress

  b) Scores ranging from 14-26 will be considered moderate stress

  c) Scores ranging from 27-40 will be considered high perceived stress

2) Work Ability Index (WAI)

- The Work Ability Index (WAI) contains questions concerning work, work ability and health status.
- The tool involves a questionnaire, which serves to conduct a self-assessment. The focus is on the health workers and their work ability assessed by themselves.
- The index is justified on the basis of the answers to a series of questions which take into consideration the demands of work, the worker's health status and resources.
- The health worker completes the questionnaire before the interview with an occupational health professional who rates the responses according to the instructions.
- Validity: The validity and reliability of the WAI has been assessed in correlation analyses. The WAI and all its items reliably assessed work disability, retirement and mortality.
- Scoring: The best possible rating on the index is 49 points and the worst is 7 points.

The total score is obtained by adding up the points of each item, except for items 2, 3 and 7 for which there are unique scoring rules.

For Item 2 (work ability in context to the demands of the job)

a. For physically demanding work

   - The work ability score for the physical demands of the job is multiplied by 1.5 (answers from 3 to 5)
   - The work ability score for the mental demands of the job is multiplied by 0.5. (answers from 1 to 2)

b. For mentally demanding work

   - The work ability score for the physical demands of the job is multiplied by 0.5 (answers from 1 to 2)
   - The work ability score for the mental demands of the job is multiplied by 1.5 (answers from 3 to 5)

c. For work that is both physically and mentally demanding the work ability score remains same

For item 3 (number of current diseases diagnosed by a physician)

- 5 or more diseases = 1 point
- 4 diseases = 2 points
- 3 diseases = 3 points
- 2 diseases = 4 points
- 1 disease = 5 points
- no disease = 7 points (only diseases diagnosed by a physician are counted)

For item 7 (mental resources), it is divided in three questions that are added together and the sum is modified as follows:

- sum 0–3 = 1 point
- sum 4–6 = 2 points
- sum 7–9 = 3 points
- sum 10–12 = 4 points

A short form questionnaire was prepared which consisted of survey related questions from Perceived Stress Scale (PSS) and Work Ability Index (WAI). Total 101 nursing students (age 19-24 years) were selected (convenience sampling) on the basis of inclusion and exclusion criteria from various Nursing colleges in Vadodara. Proper knowledge & education regarding the study was provided to the students prior to the commencement of the study. After taking consent from the students, study was executed. The questionnaire was distributed amongst the students selected for this study and the responses were recorded for further data analysis.

Results and Discussion

- Data was analysed by Microsoft Excel 2019. Prior to the statistical test, data was screened for normal distribution by Shapiro-Wilk test. After normal distribution of the data, scientific calculation was applied for data analysis.

Table 1: Frequency of different age (in years)

Age (Years)	Frequency	Percent	Cumulative Percent
19	4	3.9	3.9
20	29	28.8	32.7
21	47	46.6	79.3
22	14	13.9	93.2
23	5	4.9	98.1
24	2	1.9	100
Total	101	100	

Table 2: Age distribution in years

N	101
Mean	21.5
Std. Deviation	1.87

Interpretation: The above table shows that mean age of students is 21.5 ± 1.87 years taken for this study.

Table 3: Prevalence rate of Perceived Stress among nursing students

	Perceived Stress (in %)		
	Low	**Moderate**	**High**
Male	2	13	1
Female	8	75	2
Total	10	88	3

Table 4: Prevalence rate of Work Ability among nursing students

	Work Ability (in %)		
	Good	**Moderate**	**Excellent**
Male	5	1	10
Female	33	2	50
Total	38	3	60

In this current study, the dependant variable, Perceived Stress Scale, was used. This is the most widely used tool for the perception of stress. The scale includes a count of direct queries about current levels of experienced stress. The questions in the PSS ask about emotions and thoughts during the last month. The other dependant variable, Work Ability Index, was used. It contains questions concerning work, work ability and health status of healthcare workers.

The results of this study (using scientific calculation) showed that there was high prevalence rate of moderate level of perceived stress (88%) among nursing students but their working ability was excellent (60%) in context with their physical and psychological demands.

Conclusion

The results of this study supported the alternative hypothesis and indicated that there was significant prevalence of work related psychological stress and work ability among nursing students. But, the findings also showed that working ability was not so much affected among nursing students in relation with their physical and psychological demands. So, it was concluded that there was high prevalence rate of moderate level of perceived stress with excellent level of working ability among nursing students.

Limitations

- The present study only examined a total of 101 nursing students using a convenience sampling method and this sample size is not sufficient for identifying a significant prevalence rate of work related psychological stress and work ability among nursing students.
- This was a one time (longitudinal) study, so no follow- up with the students was taken.
- Gender distribution was unequal.

Ethical clearance: Ethical clearance was obtained from The Institutional Review Board from Pioneer Physiotherapy College, Vadodara.

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Cross Sectional Study

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Emerging Challenges Faced by Private Clinic Physiotherapist in New Normal Times During the Covid-19 Pandemic in Pune City

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Abstract

Objective: Primary Objective: To assess the challenges faced by private clinic physiotherapists in Pune after easing of lockdown using validated self-reporting questionnaire.

Secondary Objective:

1. To assess the financial impacts on private clinics.

2. To assess the foot fall in the private physiotherapy clinic in Pune after easing of lockdown.

3. To assess the physiotherapy treatment limitations during this pandemic.

4. To assess difficulties while following Maharashtra State Occupational Therapy and Physiotherapy Council (MSOTPT) guidelines while treating patients during covid-19 pandemic.

5. To assess problems faced during tele-rehab using Validated self-reporting questionnaire.

Method: A cross sectional study was done in Pune City with a sample size of 60 over the period of 3 months using self-reporting validated questionnaire. Participants were picked based on inclusion and exclusion criteria. Questionnaire was circulated through the social media & emailing the link of google form of questionnaire to the participants after the approval of ethical committee. A total of 60 participants submitted the correctly filled questionnaire. After receiving the responses, it was analysed statically and Questionnaire results was presented in the graphical form & conclusion were made according to the pie charts and graphs.

Results: Through results it was sighted that the COVID-19 pandemic reinforced critical weakness and numerous challenges for the private clinic physiotherapists. They were facing financial problems, number of patients have reduced in the clinic, they have lost their follow ups during the pandemic, many are following MSOTPT guidelines while treating patients and finding it difficult to follow the guidelines while treating patients and many have shifted their mode of practice to tele-rehabilitation and having problems in that.

Keywords: Challenges; physiotherapists; private clinic; covid-19 impact.

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Introduction

An outbreak of novel Coronavirus disease (Covid-19) in China has influenced every aspect of life.[1] The first case of covid-19 in India was reported in Kerala & the first patient of Coronavirus in Maharashtra was reported on 9 March 2020 in Pune. Covid-19 has the potential to cause severe respiratory tract infection among infected person and is commonly transmitted from person to person via hands, saliva and nasal droplets[2,3] The clinical manifestations of covid-19 comprise fever, cough, nasal congestion, fatigue, and other signs of upper respiratory tract infections including dyspnea and severe chest Symptoms corresponding to pneumonia, and, to date, no specific therapeutic drugs is found.[4-7]

Since the covid-19 spread is so fast and detrimental, many countries have shut down various institutions, social meetings, sports activities, events and even banks in an attempt to check the spread of the infection. When it was identified that community transmission was occurring, including several cases without any connections to previous cases or travel histories to China, India raised its pandemic preparedness alert level, establishing lockdown and sealed the affected area.[8] The first lockdown was imposed on 24th March and A series of gradually increased counter measures were implemented involving all professional groups, including physical therapists.[8]

Physiotherapy services provide the development, maintenance, and recovery of people's movement and functional ability, improving their quality of life.[9] During first wave lockdown all physical therapy interventions, with the exception of respiratory physical therapy in hospitals had stopped and switch into a tele-rehabilitation mode and to manage through telephone or webcam counselling exercise sessions that can be temporarily self-managed by the patient or caregiver to avoid the spread of the disease.[8] So, all private practice Physiotherapy clinic closed during first wave lockdown period.[10] During this period covid-19 reinforced critical weakness and numerous challenges for the physiotherapy profession.[10]

After loosening of lockdown private clinic practice again started all over India. During this period Physiotherapist were exposed to a higher risk of getting infected due to their close contact with their patients. In particular, physiotherapist perform their duties not only in close contact with the patients. As manual touch is important in Physiotherapy evaluation and treatment they are at higher risk of exposure and getting infected due to close contact with their patients.[5] Therefore, Physiotherapist have a high probability of getting infected from patients and spreading it to their peers, family members and other patients. Patients flow in the clinic may be reduced due to fear of infection.

Considering the current rapid spread of infection, the MSOTPT council highlighted key steps to be taken by Physiotherapist in addition to the standard universal precautions which includes, Infection control measures to be taken at the clinic/hospital includes taking patients' recent travel history; assessing sign and symptoms of RTI; recording patients' body temperature; mouth rinsing with 1% hydrogen peroxide prior to commencing any manipulations & modalities; and frequently cleaning and disinfecting public contact areas including door handles, chairs, plinths, modalities and, washrooms 2. Home visit recommendations 3. Paediatrics Care, 4. Geriatric care 5. Manual therapy recommendations 6. Tele-rehabilitation & teleconsultation and general advice.[11]

Due to Covid-19 pandemic many of private clinic Physiotherapist interrupted their practice may be due to loss of follow-ups after loosening of lockdown. Many has faced financial loss because of reduced flow in the clinic and may be due to financial burden of rent of the clinic during lockdown phase. Many of them started giving treatment via tele-rehab to compensate for loss during this pandemic. Maharashtra Occupational therapy & physical therapy council has made some guidelines to treat patients during this pandemic. In fact, most Physiotherapist may be not be aware of the recent guidelines. The purpose of this study was to determine the challenges private clinic physiotherapist faced during this covid-19 pandemic.

Materials and Methodology

It was a cross-sectional study in which a self-made validated questionnaire was used to know the challenges faced by private clinic physiotherapist in

new normal times during covid-19 pandemic. Ethics committee clearance was taken prior to start of the study. An online self-made questionnaire was made through google form. Google form link was mailed to the 60 participants by making a list of all owners of private clinics of physiotherapy and data was collected through the submitted form. The google form did not reveal the identity of the participants. After completion, the data was analysed statistically and the survey results were shown as percentage in the form of graphical representation through pie charts and bar graphs. The study was conducted from month January 2021 - May 2021 in MAEER`s Physiotherapy college, Talegaon Dabhade, Pune.

Outcome measure: The questionnaire contains six domains:

Domain 1: Demographic Data: (Age, Gender, Qualification wise distribution, distribution according to department of practice, years of experience wise distribution).

Domain 2: Questions on financial impact of covid 19 pandemic on private physiotherapy clinics.

Domain 3: Questions on foot fall in the clinic during covid 19 pandemic.

Domain 4: Physiotherapy treatment limitations during covid 19 pandemic.

Domain 5: Difficulty while following MSOTPT guidelines during covid 19 pandemic.

Domain 6: Tele-rehabilitation and its limitations.

Results

A total of 60 participants completed the questionnaire with a total of 21 questions. 21 questions comprising of 6 sections 1. Demographic data 2. Financial impacts on private clinic 3. Foot fall in the clinic 4. Treatment limitation 5. Difficulties while following MSOTPT guidelines 6. Problems faced during tele-rehabilitation.

1. Were you able to pay wages/Salaries of staff members of your clinic during covid-19 pandemic?

Able to pay salaries	Total numbers	% Distribution
Yes	14	23%
No	9	15%
Partial amount	37	62%
Total	60	

2. Did you observe any changes in patients flow in your clinic after easing of lockdown?

Patient`s flow	**Total numbers**	**% Distribution**
Yes (Increased)	16	27%
Yes (Reduced)	26	43%
No	14	23%
Don`t know	4	7%
Total	60	

3. Did you routinely follow MSOTPT guidelines in your clinic while treating patients in Covid-19 Pandemic?

Following MSOTPT guidelines	Total numbers	% Distribution
Yes	59	98%
No	1	2%
Don't know	0	0%
Total	60	

4. Did you give limited treatment at your clinic to avoid spread of Covid-19?

Gave limited treatment at clinic	Total numbers	% Distribution
Yes	23	38%
No	36	60%
Don`t know	1	2%
Total	60	

5. What problems did you face during Tele-rehabilitation?

Problems faced during Tele-rehabilitation	% Distribution
Low internet connectivity	78%
Lack of confidence	23%
Lack of digital knowledge	23%
No problems faced	15%
Don't know	3%
Total	

Discussion

The present cross-sectional study reported "Emerging challenges faced by the private clinic physiotherapist in the new normal times during Covid-19 pandemic in Pune. For this purpose, a validated self-reporting questionnaire focusing on closer ended questions was made to gather information about challenges faced by private clinic physiotherapist in new normal times during Covid-19 pandemic. The Questionnaire used in the present study collected information objectively and validated through expert physiotherapists. Challenges were faced by many fields in India during this pandemic due to impact of lockdown and fear of infection especially by the private businesses.

Financial impact has occurred to the physiotherapist during this lockdown period because people were afraid of getting out of their houses and because of this Foot fall in the clinic reduced significantly. Physiotherapist were facing difficulties while treating patients due to close contact. Many has shifted to the tele-rehab mode of treatment to avoid contact and continue their follow up and facing difficulties during tele-rehab. Many of them were facing difficulties while following respective guidelines to treat patients while avoiding close contact. Physiotherapist were treating patients and at a higher risk of acquiring infection.

First case of covid-19 in Maharashtra was found in Pune on 9th March 2020. After that gradually spreading of virus takes place. To avoid this, 1st lockdown was implemented in India from 24 March hence, all non-essential services had stopped due to this many private sector businesses faced many problems due to lack of income source. Physiotherapy comes under essential and non-essential. Essential services consist of Respiratory care in ICU patients. Physiotherapy in covid-19 patients and all other private services comes under non-essential services. So, all nonessential services had stopped during the lockdown phase and after loosing of lockdown some of the services started but with precautions. During this time many had faced difficulties.

1. Financial impact of clinic: Private Physiotherapy clinic owner had to pay their rent or EMI during lockdown, without any income, after loosening of lockdown clinics got started but due to financial issues many had to change their treatment patterns due to financial impacts on clinic turnover. Many weren't able to pay salary to their staff member of their clinic. Many were paying only partial amount of salary. Many private physiotherapy clinic owners had to closed their clinic temporary due to financial losses, some had Covid centre around their clinic and reduced patients in the clinic.

2. Foot fall in the clinic: Patients flow in the clinic had significantly reduced due to fear of covid-19 infections in people. People were afraid of getting outside the house. Many physiotherapists lost their follow-ups after loosening of lockdown. Due to this overall financial income of clinic has reduced which directly affect the income of the private physiotherapy clinic owner.

3. During Covid-19, after relaxation of lockdown many private physiotherapy services started but guidelines were made to treat patients in this pandemic to avoid the spread of diseases and maintaining social distancing. Maharashtra State Occupational Therapy and Physiotherapy Council (MSOTPT) made guideline`s for Physiotherapist to treat patients at various sectors which includes following:

Section 1: Training on Covid-19 – update the knowledge on Covid-19.

Section 2: Administration and documentation at the clinic a. Entry point, b. consent and declaration by the patient, c. Workforce planning management, d. Sanitization register e. display safety measures and posters of hand washing.

Section 3: Infection control measures a. social distancing, b. Patient`s instruction and preparation, c. Physiotherapists personal care, d. Hygiene measures for equipment, e. Biomedical waste management.

Section 4: Recommendations for special services and set-up a. Home visits recommendations b. Acute care set-up: Covid care, c. Paediatrics physiotherapy care, d. Geriatric physiotherapy care, e. Manual therapy, f. Tele-rehabilitation and teleconsultation.

Section 5: General advice.

Many physiotherapy clinics are following these guidlines to treat patients during pandemic. Many of them were facing difficulties while following these guidlines and they think that modifications should be made in the guidelines like spaced appointment, minimal contact policy, less follow-up and increase focus on home exercise program reduced the close contact with the patients.

4. Treatment limitation: Many are facing difficulties while treating patients during this pandemic due to fear of getting infection and to avoid spread of infection. Many clinics had stopped using some modalities and methods to avoid the spread. Modalities like Hot pack, cryotherapy, Hot fermentation, paraffin wax, SWD, chest pt. in paediatrics had stopped to avoid the spread. Many methods of treatment like MFR Cervical mobilization had stopped due to fear of spread of the infection. Many had given limited treatment at their clinic to avoid the spread of the disease. Many had reduced the duration of treatment during this pandemic.

5. Problems faced during tele-rehabilitation: After lockdown many had shifted their mode of treatment to the tele-rehabilitation but as in physiotherapy manual touch is important to teach and correct the exercise using manual contact. Many had faced problems like low internet connectivity, lack of confidence, lack of digital knowledge. Many had altered the charges of treatment while treating patients using tele-rehabilitation. Many had increased charges due to excess time loss during treatment and many had reduced the charges due to no modalities given during tele-rehabilitation. Many private clinic physiotherapist`s think that standard prescription format should be made for every condition during covid-19 pandemic.

Conclusion

The covid-19 pandemic reinforced critical weakness and numerous challenges for the private clinic physiotherapist. They are facing financial problems during this pandemic. Foot fall has reduced in the clinic, they have lost their follow-ups during pandemic. They have to give limited treatment to the patients to avoid closed contact with the patients. Many private physiotherapy clinics are following MSOTPT guidelines in Pune district. Many have shifted their practice to Tele-rehabilitation. They are treating patients via Tele-rehabilitation and are facing problems while treating patients.

Clinical Implications

Standard treatment format should be made to treat patients in the Covid-19 pandemic to avoid spread and excess duration of the treatment. Better internet connectivity should be provided during this pandemic so that tele-rehab can be done without any disturbance and time loss. Standard prescription format should be made for every condition while treating patients using tele-rehabilitation. Every follow-up should be treated digitally to avoid loss of time in explaining & correcting the exercise and to reduce the spread. Financial benefits should be provided by the government in the EMI & rent for such population to avoid financial impacts. More specific guidelines should be designed and legislation on the use of technologies at private clinical setup while attending the patients physically & virtually.

Future Scope

This study was done on 60 private clinic physiotherapists in Pune district. Further study can be done using larger place and population so, in the future we will be prepared for future pandemics like covid-19 to minimize the impact of these pandemics on various settings.

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Conflict of Interest- nil

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Cross Sectional Study

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The Effects of Motion Sickness on Balance and Gait

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Abstract

Background: The term "motion sickness" (also called "kinetosis") describes a set of symptoms that occur in association with motion of a person or his or her surroundings, triggering a stress reaction that results in autonomic symptoms. The onset is often insidious, with drowsiness/yawning, dizziness, reduced alertness, and symptoms progress through cold sweating, pallor, excessive salivation, and occasionally headache, to nausea and vomiting with incapacitation that can be severe. Motion sickness usually occurs due to a visuo-vestibular conflict. Part of it is psychological as well as the symptoms of motion sickness are triggered in some people by just reading about it.

Method: A cross-sectional study was performed in college going students for six months using the MSSQ-short and the Mini BESTest to assess the susceptibility of motion sickness as well as balance and gait respectively.

Conclusion: Balance and gait was found to be significantly affected in people with motion sickness.

Keywords: Balance; Gait; Motion sickness; Physiotherapy; Visuo-vestibular conflict.

Introduction

Motion sickness is most typically associated with seasickness and travel sickness. Similar symptoms can be elicited by advanced simulators and virtual reality. Being car-sick, air-sick, sea-sick, cyber-sick, etc. all fall under the spectrum of motion sickness. It is also known to occur by the intense stimulation of the vestibular system, especially by horizontal oscillatory movements. Even travelling on camels and elephants can make people sick. Simulator based environment can also be a trigger for the same. The intersensory conflict hypothesis, which includes the vestibular, visual, and proprioceptive systems as well as postural instability and asymmetry of the otolith organs, nicely sums up the multiple types of motion sickness. Pharmacotherapy can include scopolamine and H1-antihistamines like dimenhydrinate and cinnarizine.[1] But the side effect for these drugs is drowsiness which makes the consumption of these drugs in day- to-day life very difficult for students.

The frequency of lateral oscillation has a relatively profound impact on the development of minor nausea. The recent observations were combined with those from a former experiment that utilized higher oscillation frequencies to generate a frequency grading for motion sickness induced by lateral oscillation

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in the 0.0315 to 0.8 Hz range.[2] Increase in postural sway occurred before the initiation of subjective motion sickness symptoms, according to an analysis of postural motion during exposure to the moving room. This reinforces an essential prediction of the motion sickness hypothesis of postural instability.[3]

Vulnerability to motion sickness has been linked to sensitivity to discrepant or "conflicting" perceptual information from the visual, vestibular and somatosensory systems and an inability to adapt readily to these perceptual conditions. This inability to successfully resolve apparent perceptual conflicts might also result in postural instability. Motion sickness susceptibility correlated most strongly with increased sway when the visual and somatosensory feedback was absent or distorted.[4]

Environmental circumstances that result in ambiguity or conflict with the patterns of sensory stimulation may adversely affect the vestibular system. The effect of this conflict in sensory information may be dizziness, a sense of imbalance, nausea, and motion sickness sometimes even to seemingly minor daily head movement activities. In some, it is not only exposure to motion but also the observation of objects in motion around them such as in supermarket aisles or other places with visual commotion; this can lead to dizziness, nausea, or a feeling of motion sickness that is referred to as visual vertigo. All people with normal vestibular function can be made to experience motion sickness, although individual susceptibility varies widely and is at least partially heritable.[5]

College going students have been chosen as the sample population as these people have to travel the most frequently for longer duration of time. They also use modes of transport that can act as triggering factors for motion sickness, like buses, trains, cars, auto rickshaw, etc. It should also be noted that the symptoms associated with motion sickness do not disappear immediately after lack of the triggering factor. The symptoms still persist throughout the day. This not only makes it difficult for college going students, the sample population, to focus during their lectures but also decreases their motivation to attend college. The after effects of motion sickness are not pleasant too. This includes acidic taste in the mouth, loss of appetite, headaches, sensitivity to slightest of head movements, dizziness, loss of balance, etc.

Other than difficulty in travelling and sitting on rides in amusement parks, people with motion sickness also have issues of balance and gait. There is also a lack of awareness regarding the other treatment strategies available for motion sickness. Balance training, vestibular adaptation exercises, behavioral changes, optokinetic stimulation help in improving the balance and gait of these individuals.[6-9] These strategies also help in decreasing the symptoms of motion sickness as they make the vestibular system more used to the triggering factors thus reducing its sensitivity to motion as well.

Materials and Methods

The experimental study design was a cross sectional study. The duration of the study was six months. It was conducted in D.Y Patil Deemed to be University, School of Physiotherapy in 2022.30 college going students voluntarily participated in this study. They were in the age range of 18-25 years who travelled at least five days a week using the modes of transports like car, bus, train, autorickshaw, scooter, etc. for a duration of at least more than 15 minutes per day. The study included both healthy individuals as well as patients suffering from motion sickness.

Patients with vestibular impairments such as BPPV, Vertigo, hearing loss, Meniere's disease, etc., those who have had an episode of recent ear infection in the past six weeks as well as those not willing to participate were excluded from this study.

The primary outcomes of this study were:

- To assess balance and gait in patients with motion sickness (Group A: experimental group) using Mini BESTest.
- To assess balance and gait using Mini BESTest in age-matched healthy individuals (Group B: control group).
- To compare the balance and gait in patients with motion sickness and healthy age-matched individuals.

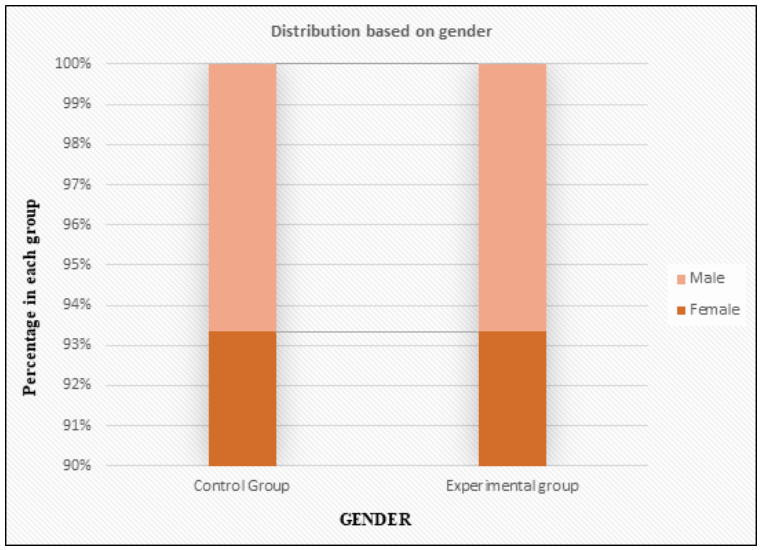
The outcome measures used were MSSQ (Motion Sickness Susceptibility Questionnaire)-short[10] and Mini BES (Balance Evaluation Systems) Test.[11]

A consent form will be circulated among the sample population before conducting the study. The above-mentioned scales would be used. Each individual will be evaluated separately and will be categorized in either "Individuals with motion sickness" (Group A), which is the experimental group or "Healthy age-matched individuals" (Group B), which is the control group. Balance and gait will be assessed in these individuals and the data collected will be analyzed. The Motion Sickness Susceptibility Questionnaire-short would be used to assess the susceptibility of the individual to motion sickness in different modes of transport. The Mini BES (Balance Evaluation Systems) Test will be used to assess the balance as well as gait while checking under the different domains of Anticipatory postural control, reactive postural control, sensory orientation and dynamic gait.

The demographic data collected was further analyzed in the form of bar graphs (for distribution based on gender) and pie charts (for distribution based on age and modes of transport). Statistical analysis was performed to compare the scores of balance and gait in the above-mentioned domains in both patients with and without motion sickness. Mean and standard deviation was calculated for each domain and one sample t-test (sigma two-tailed) was done for the same.

Results

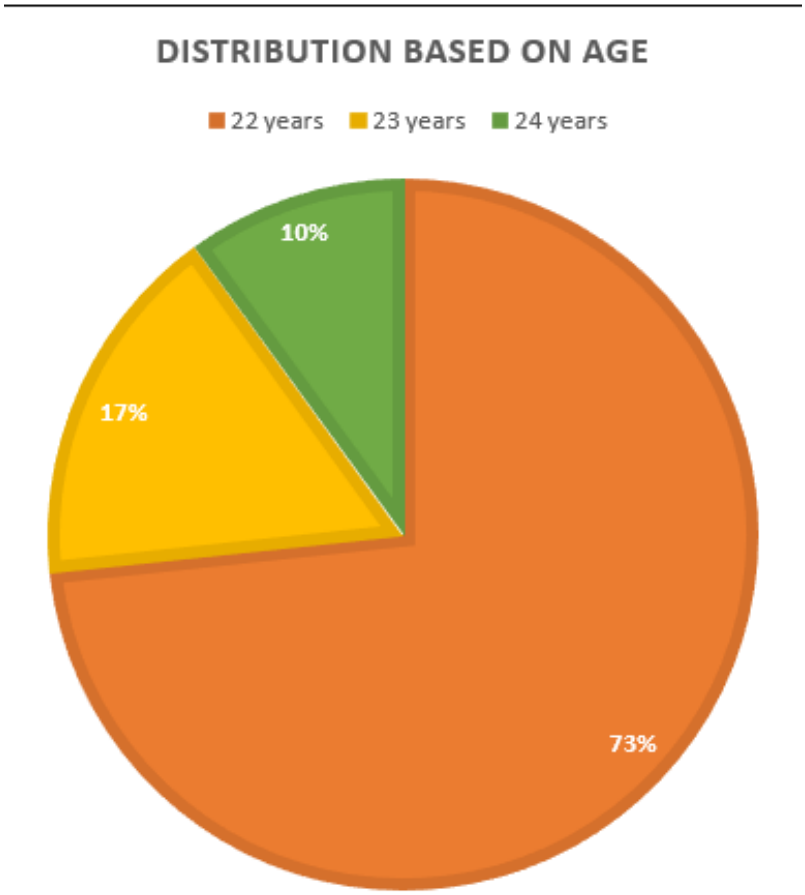
1. Distribution based on gender:



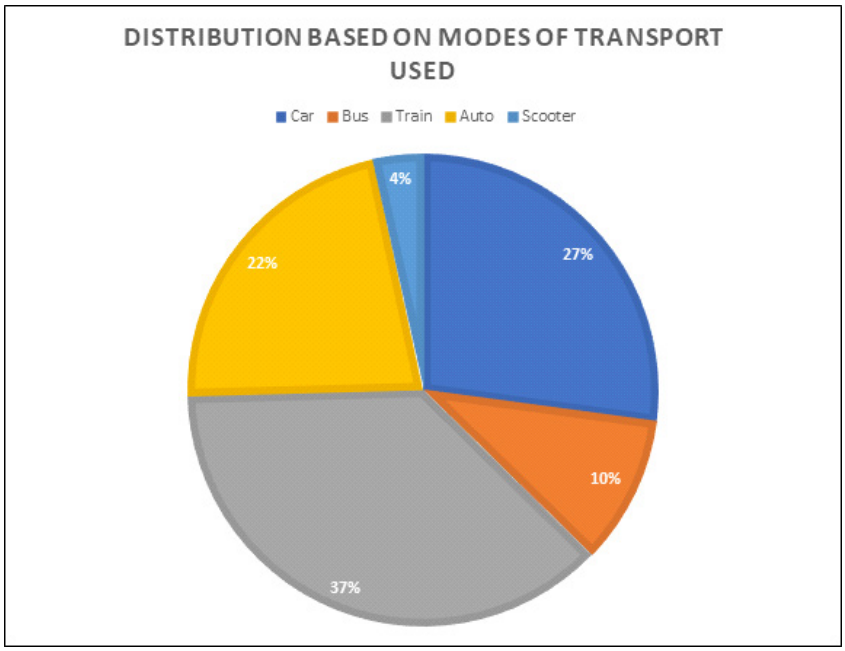
Inference:

- This bar graph depicts the percentage of males and females in the control as well as experimental group.
- 93% females have participated in this study against 7% males.
- It is evident that a greater number of females have participated in this study than males.

2. *Distribution based on age:*



3. *Distribution based on modes of transport:*



Inference:

- This pie chart depicts the modes of transport used by the sample population.
- It is to be noted that people travel through more than one mode of transport.

4. Statistical Analysis:

Table 1: Characteristics of Groups

Domain	PTS With Motion Sickness (mean ± SD)	PTS Without Motion Sickness (mean ± SD)
1. Anticipatory Postural Control	5.266 ± 0.457	5.733 ± 0.457
2. Reactive Postural Control	4.2 ± 0.861	5.6 ± 0.910
3. Sensory Orientation	4.8 ± 1.082	5.466 ± 0.743
4. Dynamic Gait	8.533 ± 0.833	8.866 ± 0.693
5. Total Score	22.80 ± 1.971	25.667 ± 1.290

Table 2: One Sample Test in Patients with Motion Sickness

Test value=0	Domains				
	Anticipatory Postural Control	**Reactive Postural Control**	**Sensory Orientation**	**Dynamic Gait**	**Total Mini BESTest score**
T	44.562	18.873	17.176	39.637	44.797
Df	14	14	14	14	14
Sig. (2-tailed)	.000	.000	.000	.000	.000
Mean difference	5.26667	4.20000	4.80000	8.53333	22.80000
95% confidence interval of the difference:					
Lower	5.0132	3.7227	4.2006	8.0716	21.7084
Upper	5.5202	4.6773	5.3994	8.9951	23.8916

Table 3: One Sample Test In Patients Without Motion Sickness

Test value=0	Domains				
	Anticipatory Postural Control	Reactive Postural Control	Sensory Orientation	Dynamic Gait	Total Mini BESTest score
T	48.511	23.827	28.487	53.662	77.000
Df	14	14	14	14	14
Sig. (2-tailed)	.000	.000	.000	.000	.000
Mean difference	5.73333	5.60000	5.46667	8.86667	25.66667
95% confidence interval of the difference:					
Lower	5.4798	5.0959	5.0551	8.5123	24.9517
Upper	5.9868	6.1041	5.8783	9.2211	26.3816

Inference: In tables 2 and 3, it has been noted that there is statistically significant difference noted between two groups with p value of 0.000 in the anticipatory and reactive postural control, sensory orientation and dynamic gait domains as well as the total score of Mini BESTest.

Discussion

As we all know, postural instability precedes motion sickness. Motion sickness simply acts as an aggravating factor for postural instability, especially anticipatory postural control. The reason behind this is the sudden increased gravitational loading of joints. Gravity acts as resistance and influences the output of muscle spindle receptors. This gives off the illusion of movement when the person is actually standing still. The sensory conflict theory says that certain stimuli lead to a conflict between the visual, vestibular and the somatosensory systems. This mismatch is what aggravates the symptoms of motion sickness in the individual. It is also the contributing factor for the presence of simulator sickness in pilots, commanders, cosmonauts, etc.[12]

A contributing factor for affection of reactive postural control is the unpredictability of the stimuli and the inability of the balance systems to compensate for it. The main trigger for motion sickness is found to be not movement but the occurrence of repeated challenges to redetermine the eye-head or the head-body systems.[13] When travelling in a vehicle it is found that the movement of the head is larger than the movement of the body. Therefore, it is noted that motion sickness can be minimized by holding the head in one fixed position or by actively tilting the head in the direction of the tilted gravitoinertia. It has also been observed that the main reason for motion sickness in cars is due to the lateral acceleration experienced leading to head tilts which acts as a trigger for the overstimulated vestibular system.[14] A similar kind of problem occurs when a person sits on the side opposite to the direction that the train is moving in. This is a major trigger for the people travelling in trains with tilting seats as well.

The vestibular system is hypersensitive in people with motion sickness. This is further proved when sensory orientation is tested in the subjects with no visual and distorted proprioceptive cues. A study was conducted where a vibrator was attached to the calf muscles to distort the proprioceptive cues and the subjects were asked to stand on a flat stable platform with their eyes open and then with their eyes closed. The postural sway is found to be more when the subjects' eyes were closed. The vibrating calf muscles contributed further to the aggravation of motion sickness. Thus, it was proven that there is heavy dependence of the vestibular system on visual and somatosensory feedback to maintain balance, especially in subjects with motion sickness.[12]

Another study also proved that virtual reality, while being a contributing factor for postural instability and motion sickness, can also be used as a rehabilitation tool to reduce the dependency on visual inputs. In this study, virtual reality is used as a means to create visuo-vestibulo-somatosensory conflict by keeping the subjects still while the surroundings move with interactive computer graphics.[15]

Motion sickness is basically a maladaptive response of the body to an external stimulus. It is said that the external stimulus that causes sensory conflict is perceived by the body as ingestion of neurotoxins which leads to the gastrointestinal symptoms of nausea, vomiting, acidic aftertaste, etc.[13] This sensory conflict has been also proven to affect the dynamic components of gait such as head tilts, pivotal turning, stepping over obstacles as well as dual tasking (Consecutive subtraction by 3 from 100 while walking), etc. It is also noted that it is easier for the patient to walk while focusing on a fixed target. The moment the focus is shifted, changes can be noted in the subject's gait with respect to cadence, postural sway, balance, etc. A study was also conducted in subjects with vestibular migraine, who had high susceptibility to motion sickness as well as poor DGI scores.[16]

Conclusion

A statistically significant difference was seen on evaluation of balance and gait in patients with & without motion sickness. Thus, in present study, when compared with healthy age matched individuals, gait and balance was found to be severely affected in people with motion sickness.

Ethical Clearance: Taken from Institutional Ethics Committee for Biomedical and Health Research, DY Patil Medical College, Navi Mumbai. (Reference number: 2022/047)

Source of funding: No source of funding.

Conflict of interests: Nil

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Original Article

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Screening for Neck and Upper Limb Injuries among Intercollegeate Volleyball Players in Selected Colleges of Bengaluru

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Abstract

Background & purpose: Volleyball is one of the most popular games in the world. The International Volleyball Federation represents about 150 million players in approximately 170 countries. Volleyball is a dynamic sport involving rapid and forceful movements of the body and of the arm and hand when spiking the ball. Injuries in volleyball are quite frequent. It is believed that an increase in the frequency, intensity and duration of training might lead to an increased rate of injury.

Methods: A prevalence study was conducted in intercollegiate 50 volleyball players between age group 18-25 were selected from the list of players fulfilling the inclusion and exclusion criteria. Players were screened for prevalence of neck and upper limb injuries using Nordic Musculoskeletal Questionnaire (NMQ) and assessed for activity limitation using Disability of Arm, Shoulder and Hand (DASH), Neck Disability Index (NDI) and Shoulder Pain Disability Index (SPADI).

Conclusion: The study was concluded that there is a more risk of upper limb injuries mainly wrist, fingers, shoulder is the more prone to Musculoskeletal disorder among volleyball players.

Results: The result of the study was observed that due to wrist injury 10% players were prevented from carrying out their normal activities during last 12 months, followed by shoulder (4%), Elbow (4%) and Neck (2%) were prevented from doing normal activities during the last 12 months.

Keywords: volleyball players; Neck and Upper limb Injuries; Nordic Musculoskeletal Questionnaire; Disability of Arm, Shoulder and Hand; Neck Disability Index; Shoulder Pain Disability Index.

Introduction

Volleyball is one of the most popular games in the world. The International Volleyball Federation represents about 150 million players in approximately 170 countries. Volleyball is a dynamic sport involving rapid and forceful movements of the body and of

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the arm and hand when spiking the ball.[1] Volleyball is an increasingly popular team sport. As with a competitive sport, there is always an inherent risk of injury. Volleyball is practiced by approximately 800 million people with diverse characteristics, including different age groups. Volleyball game was invented in the United State by William G. Morgan in 1895. Indoor (i) 6 players on floor (3 front row, 3 back row), (ii) players must rotate clockwise once serve is gained, (iii) must return within 3 hits ; initial block not counted, (iv) Players – Setters, Libero, Middle Hitter, Outside Hitters, Opposite Hitters.[2]

Volleyball is recognized as one of the most popular sports in the world amongst men and women [3] in large part due to its accessibility to a wide age group, minimal equipment requirements and the ability to play both indoors and outdoors.[4] Volleyball is practiced by approximately 800 million people with diverse characteristics, including different age groups. Sports injuries have become one of the most common injuries in contemporary Western societies and volleyball, together with soccer and basket, is at the first places in the ball-related sports causing injuries. Injuries in volleyball are quite frequent.[3] It is believed that an increase in the frequency, intensity and duration of training might lead to an increased rate of injury.[5,6] The sport involves repeated, whole-body maximal ballistic actions in addition to rapid lateral movement in response to external stimuli. As such, there is an inherent risk of injury that must be recognized. In order to manage this risk, specific injury prevention strategies are needed and should serve as an essential component to the training plan for volleyball players.

Volleyball, like any other sport, associates with injury during the tournament and pre-season trainings. Because the volleyball Playground is separated by a net; there is almost no possibility of contact between players of two teams. Therefore, it is believed that the likelihood of injury in this sport is lower than other sports, and in particular contact sports such as football and basketball.[7] However, collisions occur during attack and defence of net between players of two teams. Other risk factors for injury in this sport include landings and high jumps during spikes and attack block and diving when receiving in back court.[8] According to research results, the prevalence of injury in this sport is between 1.7 and 4.2 injuries per 1000 hours of play. Although all injuries cannot be prevented, athletic performance can be improved by preventing even one injury. Recently, physiotherapists use functional movement tests and especially Functional Movement Screening (FMS) as a screening tool in order to predict injuries, followed by the development of preventive strategies. Gary Cook et al. developed FMS for the first time so as to identify those with compensatory movement patterns in their kinetic chains. This screening tool consisted of seven movement tests that require balancing between mobility and stability. These tests include movement patterns of deep squat, hurdle step, inline lunge, shoulder mobility, active straight leg raise, trunk stability push up, and rotary stability.[9]

Body Biomechanics In Volleyball Players

An earlier study conducted by Wendy J. Hurd at all concluded in their study stated body mechanics with respect to each phase of throwing biomechanics and what kind of musculoskeletal disorders.

Phases of volleyball divided into

1. Wind up/approach
2. Cocking
3. Acceleration
4. Deceleration/follow through

Wind up: Serve- Relatively low activity during serve Attack - Synergistic action of anterior deltoid and supraspinatus to position Humerus overhead. Infraspinatus and teres minor act to position humeral head within glenoid fossa.

Cocking: Serve- Humerus remains elevated with horizontal extension and maximum external rotation of the shoulder. Increase in activity for inner (subscapularis and teres major) and outer (latissimus dorsi and pectoralis major) anterior wall muscles may be secondary to their protective role against anterior subluxation. Attack- Supraspinatus and anterior deltoid continue to work to maintain humeral elevation. Ifraspinatus and teres minor function to achieve shoulder external rotation.

Acceleration: Serve- Float serve acceleration is comparatively slower placement is objective. Peak

teres minor activity as it functioned to restrain anterior humeral translation. Anterior wall muscles acting to internally rotate and adduct humerus.

i. Attack- Maximum force generation is objective. Less anterior deltoid and supraspinatus activity as arm is moving into extension. Teres minor limiting anterior humeral translation. Peak anterior wall muscles activity.

Deceleration/follow through:

i. Serve- More limited follow through with float serve. Anterior deltoid and supraspinatus control humerus extension. Infraspinatus and teres minor act to compress humeral head in glenoid fossa. Minimal anterior wall muscle activity.

ii. Attack- Kinetic energy dissipation distributed across deceleration and follow through. Humerus did not remain elevated, resulting in relatively low anterior deltoid and supraspinatus activity. Infraspinatus and teres minor playing stabilizing role. Lower anterior wall muscle activity.[10]

This study focus to rule out for the Neck and Upper Limb musculoskeletal discomfort and associated injuries affect the performance of intercollegiate volleyball players in selective colleges of Bengaluru.

Methodology: Method of Data Collection

Source of Data:

The data for the study will be collected based on the following categories:

- **Study setting:** Selected colleges in Bengaluru
- **Study subjects:** Intercollegiate volleyball players
- **Study design:** Descriptive study
- **Sampling technique:** Purposive sampling
- **Study recruitment:** selected colleges in Bengaluru
- **Sample size calculation:** n=50

Inclusion Criteria:

- Volleyball players between the age of 18 to 25 years
- People who are in volleyball practice
- Subjects willing to participate and sign the informed consent

Exclusion Criteria:

- Candidates with musculoskeletal injuries (neck pain, shoulder pain etc)
- History with upper limb surgery and back surgery
- Subjects who have already participated in similar kind of study

Method of Collection of Data:

Materials Required:

- Stationeries
- Consent form printouts
- Screening form: Standardized Nordic Questionnaire
- Questionnaires print outs
  1. Neck Disability index (NDI)
  2. Disabilities of the arm, Shoulder and Hand (DASH)
  3. Shoulder pain Disability Index (SPADI)
  4. Numeric pain rating scale

Procedure:

The investigator personally contact corresponded college authorities and obtain permission from the concerned authorities and with the subjects. Subsequently after obtaining the permission, the investigator will be screening the subjects for meeting the requirements of inclusion criteria and the study will be continued.

Study subjects will be screened using Standardized Nordic Questionnaire, and after finding their suitability according to the inclusion and exclusion criteria, the subjects with discomfort of neck and upper limb will be further documented with Neck Disability index(NDI), Disabilities of the arm, Shoulder and Hand(DASH) and Shoulder pain

Disability Index (SPADI) to record the discomfort of neck and upper limb. The demographic data including name, age, gender and duration of practice in day o r week will be obtained. The subjects will be briefed about the nature of study.

Neck Disability Index: The neck disability index will be to know how neck discomfort adversely affects their daily activities like dressing, personal care, driving, recreational activity, etc. The NDI consisted of 10 components and each component were scored from 0 to 5. In the neck disability index, the subjects will be asked to tick the options available. The score out of 50 will be documented.

Numeric Pain Rating Scale: This scale will be used to know the intensity of neck pain. The scale numbered from 0 to 10 was distributed to the subjects. The subjects will be asked to score their pain out of 10. The result will be then collected and documented.

Shoulder Pain Disability Index (SPADI):

The patient is instructed to choose the number that best describes their level of pain and extent of difficulty using the involved shoulder. The pain scale is summed up to a total of 50 while the disability scale sums up to 80. The total SPADI score is expressed as a percentage. A score of *0* indicates best 100 indicates worst. A higher score shows more disability. In scoring SPADI, any question missed should be taken out of the total score of each subscale. i.e if 1 question is omitted in the pain section, the total score is divided by 40.[12]

Disabilities of the ARM, Shoulder and Hand (DASH):

The Disabilities of the Arm, Shoulder and Hand (DASH) questionnaire is a 30-item questionnaire that looks at the ability of a patient to perform certain upper extremity activities. This questionnaire is a self-report questionnaire that patients can rate difficulty and interference with daily life on a 5 point Likert scale.[13]

Stastistical Analysis: The data collected for this study was analyzed statistically in the following categories:

Descriptive statistics: All the categorical variables were presented in the form of frequency tables and graphs whereas necessary. The quantitative variables were summarised using Mean ± SD with 95% confidence interval of Means.

Statistical Software: The data collected study was entered in Microsoft version 2010.

Discussion

Volleyball is one of the most popular games in the world. Volleyball is a dynamic sport involving rapid and forceful movements of the body and of the arm and hand when spiking the ball.[1] Volleyball is an increasingly popular team sport. As with any competitive sport, there is always an inherent risk of injury.[2]

The current study aimed to screen the neck and upper limb injuries in volleyball players. A similar study was conducted at Annamallai University in Andhra Pradesh. Aim of the study was to quantify the injuries of varsity volleyball players and to determine the temperament, position, incidences and parent of injuries involved in varsity men volleyball players at Annamalai University. Players age ranged from 18-26 years participated in the study. Self-administered sports injuries questionnaire was used to screen the injuries. The results showed that were most commonly injured anatomical location. Shoulder (28.57%), ankle (26.20%), finger (14.26%), thumb (11.90%) & knee and wrist (7.14%). The study concluded the rate of injuries and their injuries affecting shoulder, ankle and finger represent a significant source of disability and impaired performance for professional volleyball players.[3] A similar study was conducted in the two Danish elite division. A total of 70 female players were participated in that study. A means of a questionnaire survey had used for the screen the injury. The results showed that Finger (21%) and (18%) overuse injuries to shoulder (15%) and knees (16%).[7]

In this study using musculoskeletal disorders were noted using Nordic musculoskeletal questionnaire. Overuse of shoulder in spiking and serving will cause the injuries in shoulder and wrist. Musculoskeletal Disorders in volleyball players has impact on affecting their activities of daily living (ADL). The present study showed that the prevalence of neck trouble in last 12 months was 2.0%. Prevalence of shoulder trouble in last 12 months was 28%, Trouble

during the last 7 days was 14% and ADL affected in last 12 months was 4%. Prevalence of Elbow trouble in last 12 months was 4%. In wrist trouble during last 12 months was 32%, Trouble during the last 7 days was 18% and ADL affected in last 12 months was 10%. DASH analysis shows Mean-12.10, SD-7.32, Minimum-3.30 (N=25/50) and Maximum-27.50 (N=25/50).NDI showed that out of 50 subjects only 1 respondent complained of neck discomfort and which is 14% neck disability. SPADI analysis showed that pain score mean value 19.08, Total disability score mean value 0.64 and Total SPADI score mean value 20.64 out of (N=13/50).

Limitations:

- Unavailability of scales in local language
- Larger population of Intercollegiate volleyball players could have been included
- Current study was only determined to find out the prevalence of Musculoskeletal Disorder but did not focus to prescribe the exercise.

Conclusion

The results of the study showed that the prevalence of upper limb injuries among intercollegiate volleyball players age ranged between 18-25 years. In the present study out of 50 players the most prevalent Musculoskeletal Disorder was wrist with prevalence of 32% in last 12 months, 18% in the last 7 days and 10% in last 12 months where ADLs were affected.

Hence, the study concluded that there is a more risk of upper limb injuries mainly wrist, fingers, shoulder is the more prone to Musculoskeletal disorder among volleyball players.

Conflict of Interest: There was no personal or institutional conflict of interest for this study.

Source of Funding: Self.

Ethical Clearance: Ethical clearance taken from R.V. College of Physiotherapy, Bengaluru

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