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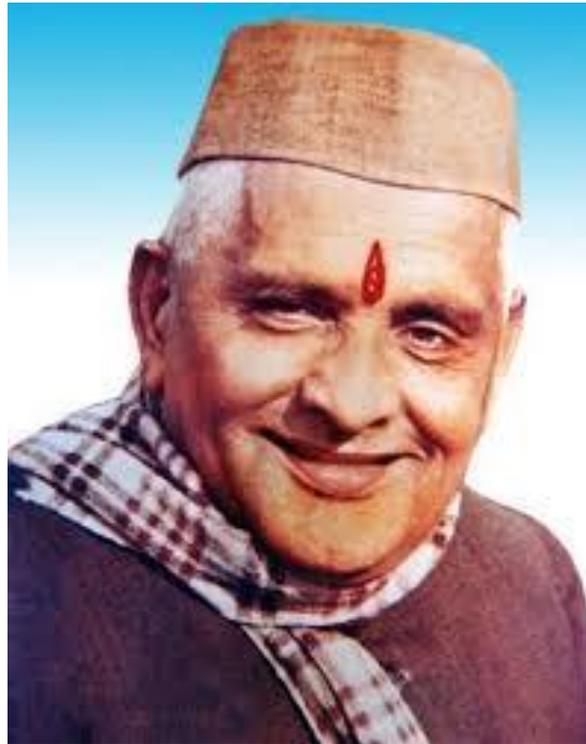




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(Deemed To Be University), Udaipur

OUR BELOVED FOUNDER



Late Manishi Pt. Janardan Rai Nagar

16th June 1911 – 15th August, 1997

Popularly known as 'jannu bhai', the Late manishi's vision, farsightedness and sacrifice have enabled us reach the stature we enjoy today. He lit the lamp of knowledge by giving birth to an institution, named 'Hindi Vidhyapeeth' on August 21, 1937 to spread education among those who were economically handicapped, and thereby enable them to learn the meaning of freedom since then, the institution has been catering to the growing educational needs of an economically poor society having a rich socio-cultural heritage. Although the Manishi is not amongst us today, his ideals inspire us to fulfil the mission of imparting qualitative education to the society through preservation of our long cherished sociocultural values. We cherish his deeds and ideals, and strive to walk on the path shown by him.



Janardhan Rai Nagar Rajasthan VidhyaPeeth

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Vice chancellor's message



It gives me immense pleasure to learn that the 1st volume of international journal of physiotherapy and cancer rehabilitation is being published by department of physiotherapy. Sincere effort and keen interest taken by the members of department in the development of academics and research activities deserve all the admiration. I wish to express with a deep sense of joy and satisfaction on the release of this volume and the same moment to continue even in greater magnitude in the coming years so that the department accomplishes commendable place in the luminous field of physiotherapy and cancer rehabilitation at the international level.

Wishing all a scintillating success.

Prof. S.S. Sarangdevot

Vice chancellor



Janardhan Rai Nagar Rajasthan VidhyaPeeth

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Editorial desk



It gives me immense pleasure to write editorial for this 1st volume of IJPCR. The department of physiotherapy J.R. Nagar Rajasthan Vidhyapeeth (Deemed to be) University journal with a vision to promote physiotherapy and cancer rehabilitation including palliative care and uptake knowledge through new innovative research papers, case reports and review articles in various field of physiotherapy and cancer rehabilitation specialities. This journal with consistent precious publications ultimately aims to reach out to he international standards.

Our world is changing we face mounting challenges of Health Care to name a few. Their solution will require new ideas, discoveries, talents and innovations the fruits of research. To achieve them we must start by changing the way we do research there has to be free movement of people & ideas.

At this juncture I wish to express my profuse thanks to all those who made an appreciable contribution for this journal and further I anticipate that their majestic effort shall continue, so to bring greater glory to our endeavours.

The arena of physiotherapy which as a matter of fact, works as a back bone of medical rehabilitation field should further be developed, for greater benefit to our suffering humanities.

I implore & solicit all our members to spare no stone unturned in this noble and glorious mission.

I whole heartedly wish to express my deepest sense of gratitude to Honb'e chancellor & Honb'e vice chancellor for their untiring help, relentless support and tremendous encouragement without which the present work would not have achieved its glorious completion.

On the behalf of editorial board I request to all the physiotherapist academicians, clinicians, Palliative care team members, research scholars and students to contribute articles for this journal.

I pray to almighty to grant all of us still greater success in times to come.

Dr. Shailendra Mehta

Editor in chief



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TITLE PAGE

TITLE OF THE STUDY:

A PILOT STUDY TO FIND OUT WHETHER LOW INTENSITY DYNAMIC EXERCISE CAUSES VERTEBRAL COLUMN HEIGHT REDUCTION IN YOUNGS

AUTHORS AND AFFILIATIONS:

1. Harish S Krishna

Professor & Principal, Sree Anjaneya College of Paramedical Sciences, Malabar Medical College Hospital & Research Centre, Calicut-673323. sharpinsightimaging@gmail.com.

2. Jazeel N M

Assistant Professor, Sree Anjaneya College of Paramedical Sciences, Malabar Medical College Hospital & Research Centre, Calicut-673323. jazeelnm@gmail.com.

3. Riyas Basheer K B*

Assistant Professor, Sree Anjaneya College of Paramedical Sciences, Malabar Medical College Hospital & Research Centre, Calicut-673323. +919995092825, riyas2423@gmail.com.

4. Madhuripu P

Assistant Professor, Sree Anjaneya College of Paramedical Sciences, Malabar Medical College Hospital & Research Centre, Calicut-673323. madhuripu@gmail.com.

5. Sreejisha P K

Assistant Professor, Sree Anjaneya College of Paramedical Sciences, Malabar Medical College Hospital & Research Centre, Calicut-673323. sreejishapk5@gmail.com.

6. Dainy Varghese

Professor, Sree Anjaneya College of Paramedical Sciences, Malabar Medical College Hospital & Research Centre, Calicut-673323. dainy_mpt@yahoo.com.

ABSTRACT

Intervertebral discs contribute one fourth of the total vertebral column height. IVD allow the movement between vertebral bodies and transmit the forces and the basis for locomotion .When the axial compression is greater than interstitial osmotic pressure ,water extrude through the disc wall and result in decrease in the height and total body height .During day ,due to constant force of gravity and muscular activity. This study was to find out whether low intensity exercise reduces vertebral column height. The low intensity exercise was 20 min jogging in the ground. The C7 and S2 spinous process were palpated and marked with a dot on the skin over the middle of the spinous process of 20 asymptomatic subjects of age group 18-21. It was measured before running and recorded vertebral column height. The subjects were allowed to run for 20 minutes in low intensity. Following the run, the subjects were aligned to palpate the C7 and S2 spinous process and the second vertebral column height measurement was taken. Height of the subject also measured prior and after the exercises by using stadiometer. This study shows that there is significant height difference ($p < 0.05$) and No significant change in Vertebral Column Height / Trunk height ($P = 0.098$) after low intensity exercise. This study concludes that there is no statistically significant reduction in vertebral column height after low intensity exercises, which have a high clinical relevance.

Key words: Vertebral Column Height, Intervertebral Disc, Youngs, Height, Loading response, Low Intensity Exercise.

A PILOT STUDY TO FIND OUT WHETHER LOW INTESITY DYNAMIC EXERCISE CAUSES VERTEBRAL COLUMN HEIGHT REDICTION IN YOUNGS

INTRODUCTION

The spinal column is one of the most important body parts. Without it you could not support yourself upright and perform many complex functions. A healthy spine will optimize the body's transmission of energy and go through daily tasks with ease and comfort.

Intervertebral discs (IVD) are the connection between two adjacent vertebrae .It consist mainly of 3 parts;(i)Nucleus pulposus: the abundant mucopolysaccharide in it help for movement in spine by deforming and under compression alter the shape of the disc, (ii)Annulus fibrosis : because of its high collagen content it act as load bearing structure, and (iii)The vertebral end plates : can tolerate high compressive forces. IVD's contribute one fourth of the total vertebral column height (VCH).^{1,2}

IVD allow the movement between vertebral bodies and transmit the forces and the basis for locomotion .When the axial compression is greater than interstitial osmotic pressure, water extrude through the disc wall and result in decrease in the height and total body height. During day, due to constant force of gravity and muscular activity, IVD loses its height and

when the person is recumbent water imbibed to the nucleus pulposus to restore the height. Dynamic load shrinks the IVD most than static load.^{3,4}

IV discs appeared to perform differently in a variety of body positions in both genders. Discs are pads of soft tissue that lie between the vertebrae. Its main function is to act as shock absorbers and provide separation between each vertebra. It is also responsible for the flexibility of the spine. On average, your total discs account for one-quarter the length of your vertebral column 4.50" to 6" (12 to 15 cm) for most people. The thicker those discs, the longer your spinal column is and the taller you become.⁵

IVD are made up of water, and when the discs compress beyond a certain pressure, they will leak water through the disc wall. The result is a loss in disc height and volume, and therefore a slight change in overall height, as intervetebral discs make up one-third of the height of spinal coulumn.

Although everyone's vertebral column height decreases throughout the day, running speeds up the rate of shrinkage because the discs compress significantly more under the force of stride. Studies found that running for 30 minutes at moderate intensity decreases disc height by about 6.3 percent.⁶ Each disc in the lower spine is about seven to 10 millimeters thick, so if we assumed each disc was that thick (a generous assumption, as normal discs get as small as three millimeters higher up) that's a maximum about 10 to 15 millimeters off of height after a half-hour jog on the treadmill. Since it is proven that moderate intensity running decreases the height of the vertebral column,⁷ we are trying to find out whether low intensity exercise do any role in reduction of vertebral column height.

Objective of the study is to find out whether low intensity exercise affect vertebral column height and thus to determine whether low intensity exercise is preferable for patients suffering from spinal segment diseases.

METHODOLOGY

Sampling: The participants in the study were college students of age between 18-21 years of both sexes. The design of the study was pre-post interventional study. And the sampling technique we administered was purposive sampling. Subjects with scoliosis, limb length discrepancy were excluded from the study.

Test Procedure: The study utilized a pretest / post test to determine if there is any relation between low intensity exercise and vertebral column height. The low intensity exercise was 20 min jogging in the ground with the guidance and supervision of qualified physiotherapists. The C7 and S2 spinous process were palpated and marked with a dot on the skin over the middle of the spinous process of 20 asymptomatic subjects of age group 18-21. It was measured before running and recorded vertebral column height. The subjects were allowed to run for 20 minutes in low intensity. Following the run, the subjects were aligned to palpate the C7 and S2 spinous process and the second vertebral column height measurement was taken. Height of the subject also measured prior and after the exercises by using stadiometer.⁸

To avoid measurement error we done three measurements of each variable by three different evaluators and calculated the average value for each variables.

RESULTS

Statistical Analysis: For the descriptive statistics mean and standard deviations were used for age, pre-post pulse rate, pre-post height, and pre-post vertebral column height. Paired sample t test was used to compare the means of height difference and vertebral column height within the group with p value <0.005 considered as statistically significant.

Table 1 shows the descriptive statistics of the subjects participated in the study. The pulse rate of the subject, height and vertebral column height prior to the moderate intensity exercise was 79.50 bpm, 166.35 cm, and 47.15 cm respectively. After the moderate intensity exercise the subjects pulse rate, height and vertebral column height was changed to 98.30 bpm, 164.84 cm and 44.90 cm respectively. The mean difference of height and vertebral column height prior and after to the exercise was 1.51 cm, and 2.25 cm correspondingly.

Table 1.Descriptive statistics of the subjects

Variables	Mean ± Std. Dev
Age	19.70 ± 1.25
Pulse pre (bpm)	79.50 ± 4.43
Pulse post (bpm)	98.30 ± 10.06
Height Pre (cm)	166.35 ± 7.30
Height post (cm)	164.84 ± 7.08
Height Difference (cm)	1.51 ± 0.82
Vertebral column height Pre (cm)	47.15 ± 5.43
Vertebral column height Post (cm)	44.90 ± 3.45
Vertebral column height Difference (cm)	2.25 ± 3.85

Within the group comparison by using paired t test shows significant difference in height (p=0.000) and vertebral column height shows statistically not significant difference (0.098).

Table 2.Paired sample t test comparison within the group

Variable	Mean ± SD	t value	Sig. (2 –tailed)
Height (Pre – Post)	1.51 ± 0.82	5.84	0.000
Vertebral column height (Pre – Post)	2.25 ± 3.85	1.85	0.098

DISCUSSION

The study is initiated to check the effect of low intensity exercises (20 minutes jogging) on vertebral column height. Twenty healthy volunteers participated in this study. The vertebral column height is measured by noting the distance in centimeters between C7 and S2 spinous process before and after the exercise. The study shows that there is no statistically significant

difference in vertebral column height after a low intensity exercise, which is clinically relevant when considering the exercise prescription of an IVDP patient.

The loss of vertebral column height is a well documented phenomenon in literature. The reason behind the loss over 24 hours are fluid loss due to decrease disk volume, radial bulging of annular fibers, bulging of vertebral end plates into vertebral body and increase in lordosis. In most of the studies the vertebral column height is checked after a strenuous exercise (one hour running, static loading for 3-4 hours etc.) all the studies have proved that the VC height reduces by 1.2- 1.5 mm.^{9,10,11}

The only way for the discs to return to a more youthful state is to stimulate the spine. This can be done by regular stretching and moving the spine through its full range of motion so that blood circulation and fluid content of the discs are increased. Otherwise, the discs may lose its elasticity and become rigid, and hence will lead to height loss. Regular stretching and inversion can help increase your height by expanding the discs and lengthening your spine. These discs acquire nourishment through fluid-attracting and fluid-absorbing qualities of its jelly-like nucleus. During non-weight bearing activities (like sleeping) the discs expand as they soak up fluid, increasing the length of the spine by as much as an inch overnight.¹² However, the pull of gravity during the day results in compression fatigue that causes the average adult loses an inch in height each day primarily because fluid is squeezed out of the spinal discs (this reverses during sleep). Therefore, if you measure yourself in the morning right after you wake up, you are about an inch taller than if you were to measure yourself at night.

The second important component of the spine is the supporting muscles i.e. adjoining muscles and ligaments. They help you move and support your spine. Muscles are used for three basic functions; support, movement and posture control.

Present study aims to find out whether a low intensity exercise too makes such changes and found that it doesn't affect much. The reason behind it can be the short term nature of the spine loading. It has been proved that the radial bulging never occur immediately after the load is applied and the creep mechanism following loading takes time reason being the biochemical composition of annular fibers. The fluid in the disk also won't gain or lost over a short period of time. Our findings are supported by the study conducted by M. Kordi et al on the disk height in bed ridden patients using MRI.¹³ They have found that the immediately following bed rest there is no change in vertebral disk height and the height increased only after 3-6 months of bed rest.

CONCLUSION

This study concludes that there is no statistically significant reduction in vertebral column height after low intensity exercises, which have a high clinical relevance. We also recommend conducting this study in large population to find out clinical correlations.

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Conflict of Interest: The authors have no conflicts of interest to disclose.

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A STUDY ON THE EFFECTIVENESS OF BALANCE TRAINING PROGRAM USING THERA TUBE IN IMPROVING BALANCE AND ACTIVITIES OF DAILY LIVING IN PATIENTS WITH CHRONIC ANKLE SPRAIN

By,

Dr.P.Senthil Selvam,Ph.D

HOD & Professor

School of Physiotherapy

VISTAS (Vels Inst. Of Science , Technology & Advance Studies

Pallavaram

Chennai

&

Dr.A. Anitha

Asst. Prof,

Saveetha College of Physiotherapy

Chennai

INTRODUCTION

Sprain is defined as an injury in a joint, caused by the ligament being stretched beyond its capacity. Sprain can occur in any joint but are most common in the ankle and wrist. Lateral ankle sprains are among the most common injuries incurred while performing daily living and sports activities that are mostly concerned with young physically active individuals^{1,2,3}. Chronic ankle sprain usually refers to the fact that either the injury occurred over six (6) weeks ago or if it is still painful, or if there occurs a repetitive injuries to the same ankle.

It has been estimated that the incidence is about one ankle sprain per 10,000 people per day⁴ and the rate of recurrence for an ankle sprain has been reported to be as high as 70%.^{5,6} Simple ankle sprains are not as innocuous as many believe with high rates of prolonged symptoms, decreased physical activity, recurrent injury and self-reported

disability.^{7,8} When an acute sprain is left untreated, the ankle may develop chronic ankle instability - a condition with persistent discomfort and a continual "giving way" of the ankle and pain during activity. It is estimated that approximately 30% will develop chronic ankle instability after the first initial lateral ankle sprain.⁷

A chronic ankle sprain is often also known as chronic ankle instability. This is almost always a result of repetitive accidents to the ankle joint. Chronic ankle instability, usually a result of recurrent sprains, is an ongoing problem, especially among active individuals. The incidence of residual symptoms and development of chronic ankle instability after lateral ankle sprain have been reported to be between 31% and 40%. Independent of the initial treatment, persistent symptoms or re-injuries remain in 10–30% of individuals.⁹

In the chronic ankle sprain condition, the ligaments have become stretched out to the point that the ankle continually subluxes or "turns under". Usually a chronic ankle sprain is the result of multiple acute sprains where the ligaments have not been allowed to heal correctly. This can range from a mild nuisance to a severely debilitating condition with associated other issues. Individuals who have chronic ankle sprain, repeatedly sprained their ankle may feel unstable and "floppy" when walking in their ankle. If an acute sprain is left untreated, the ankle may develop chronic ankle instability - a condition with persistent discomfort and a continual "giving way" of the ankle and pain during activity^{10,11}

If one has sprained the ankle in the past, one may continue to sprain it if the ligaments did not have time to completely heal. If the sprain happens frequently and pain continues for more than four weeks to six weeks, you may have a chronic ankle sprain. Activities that tend to make an already sprained ankle worse include stepping on uneven surfaces, cutting actions and sports that require rolling or twisting of the foot.

Ankle instability can be defined as either mechanical or functional instability⁹. Mechanical instability refers to objective measurements of ligament laxity, whereas functional instability is defined as recurrent sprains and/or the feeling of giving way. Causal factors include a proprioceptive deficit, muscular weakness, and/or absent coordination.

Ankle sprains vary in severity and consequential disability based on the degree to which the ligaments are damaged. In most cases, ankle sprains are graded as mild, moderate, or severe. Depending upon the severity of the injury to the ankle, a sprain may cause both

pathologic laxity^{12,13} and impaired sensorimotor control about the ankle.¹⁴ Increased ankle joint laxity and sensorimotor deficits from a single or multiple ankle sprains have been shown to be related to impaired balance¹⁵ and diminished lower extremity function. Chronic ankle sprain is a result of grade 2 and grade 3 injury. When these injuries do not heal completely due to repeated injury to the same region may lead to ankle instability which will have its effect in affecting the balance.

The incidence of recurrent ankle sprain is high and leads to ligamentous damage as well as damage to the mechanoreceptors. Damage not only occurs to the structural integrity of the ligaments but also to various mechanoreceptors in the joint capsules, ligaments, and tendons about the ankle complex. Collectively, the receptors offer feedback regarding joint pressure and tension, ultimately providing a sense of joint movement and position. When afferent input is altered after injury, appropriate corrective muscular contractions may be altered. Long-term effects of repetitive ankle trauma leave an individual more susceptible to degenerative changes. Because of the degenerative changes and a reduction in proprioceptive awareness, a correlation to postural instability may exist, leading to a sense of not being coordinated and a loss of movement control. A deficiency in any area, results in perceived sense of instability. Thus, damage to the mechanoreceptors surrounding the ankle joint with a lateral ankle sprain may contribute to functional impairments and chronic instability subsequent to initial injury and later leading to balance deficits during quiet standing¹⁶ thereby leading to impairment in performing the activities of daily living.

Postural-control deficits during quiet standing after acute lateral ankle sprain and in those with chronic ankle instability have been frequently reported. While it is difficult to directly prove that an ankle sprain causes impaired balance, there is indirect evidence that balance is impaired following an ankle sprain and impairments in balance can be improved using rehabilitative exercise.¹⁷ Prospective studies have shown that ankle injury prevention exercises are effective in reducing the incidence of ankle injuries.¹⁸

The ankle joint plays an essential role in balance control as the location of the center of pressure depends on the ankle joint position and leg muscle (plantar flexor and dorsiflexor) activity. Balance control in unilateral standing will be disturbed in patients with functional ankle instability.

Following an ankle sprain, a relatively high percentage of individuals develop chronically unstable ankles and these individuals report a feeling of giving way when on balancing and performing daily activities. Balance deficits have been frequently reported in individuals with chronically unstable ankles^{19,20} a combination of strengthening and coordination exercises, with an ankle disk or wobble board, to rehabilitate the injured ankle joint.^{21,22,23} These exercises have been recommended by numerous authors^{9,23} to improve balance,^{9,23} and to reduce the incidence of ankle sprains.

In ankle instability, balance problems occur and are a result of proprioceptive deficits. This factor probably plays an important role in recurrence of ankle sprain. For rehabilitation after injury or prevention of re-injuries, proprioceptive training has been recommended throughout the literature.^{24,25,26}

A variety of rehabilitation exercises, such as an ankle disk, weight training, elastic resistance exercises, and foam exercises to rehabilitate the ankle joint. Elastic tubing and elastic bands are often used in therapeutic exercise programs.^{27,28} There are many inherent advantages of elastic resistance exercises: ease of use, low cost, they are highly versatile and finally they impose a weight bearing overload on the joint to be rehabilitated²⁹. Elastic tubing exercise is often used in conjunction with other rehabilitation exercises to promote ankle strength and balance in patients with recurrent ankle sprains. When utilizing elastic resistance exercise to rehabilitate a chronically unstable ankle, the unaffected ankle is attached to the elastic tubing and the affected ankle experiences a weight-bearing overload to resist against the perturbation force. To maintain balance in response to the balance- disrupting force imposed by elastic tubing, the weight-bearing ankle must actively resist in the opposite direction against the imposed perturbation force.

Thus, in my study, I use thera band to improve the balance in patients with chronic ankle instability and thereby improving the activities of daily living thereby preventing recurrence of injury.

1.1 AIM OF THE STUDY

The aim of this study is to find the effectiveness of balance training program using thera tube in improving balance and activities of daily living in patients with chronic ankle sprain.

1.2 HYPOTHESIS

Null hypothesis (H_0): There is no significant improvement in balance and activities of daily living in patients with chronic ankle sprain by using thera band in the balance training program.

Alternate hypothesis (H_1): There is significant improvement in balance and activities of daily living in patients with chronic ankle sprain by using thera band in the balance training program.

1.3 BACKGROUND OF THE STUDY

The research report “Ankle Instability Is Associated with Balance Impairments: A Meta-Analysis” by Arnold et al published in the Medical Science for Sports Exercise, Volume 41; December 2009 suggested that balance is affected following ankle sprain.

On the basis of their results, it appears that individuals with ankle instability have deficits in their balance. These deficits appear to exist regardless of whether balance is assessed with static or dynamic tests.

Ankle instability is common after ankle sprains and is characterized by feelings of "giving way" at the ankle and recurrent ankle sprains and have predicted ankle sprain injury in physically active individuals. As a result of this association between balance deficits and ankle sprain injury, single-leg balance tests have been used as clinical and research examinations to assess postural instabilities associated with ankle instability.

One reason balance tests are used to evaluate postural instabilities associated with ankle instability is due to the work of Freeman et al., who reported that functional ankle instability. Freeman et al. proposed that disrupted sensorimotor pathways associated with ankle instability diminished postural reflex responses, causing single-leg balance deficits. However, the balance literature on ankle instability lacks consistency in reporting balance deficits associated with ankle instability, as some researchers have indicated that balance impairments exist with ankle instability, and other researchers have reported that balance deficits are not associated with ankle instability.

1.4 NEED AND SIGNIFICANCE OF THE STUDY

The purpose of this study is to describe the outcomes measures of patients with chronic ankle sprain when being treated with thera bands. Evidences suggest that thera band training can be effective in restoring balance and functional stability in patients with chronic ankle sprain. But there is no evidence these patients exhibit improvement following the training. Thus, the significance of this study is to find if thera band balance training can be effectively in improving the balance and activities of daily living following a chronic ankle sprain. The implication of the findings of these studies is that balance training using thera band may be an important element in the successful rehabilitation of patients with chronic ankle sprain thereby improving the balance may help alleviate the symptoms of functional ankle instability and reduce the rate of recurrent ankle sprains.

1.5 OPERATIONAL DEFINITION:

1. **Chronic ankle sprain**¹¹: chronic ankle sprain is a condition, in which the ligaments have become stretched out to the point that the ankle continually subluxes or "turns under". Usually a chronic ankle sprain is the result of multiple acute sprains where the ligaments have not been allowed to heal correctly.

2. **Balance**¹¹: Balance is the ability to maintain upright posture while keeping the center of gravity within the base of support.

3. **Chronic ankle instability**¹¹: Chronic ankle instability is a condition characterized by a recurring "giving way" of the outer (lateral) side of the ankle. This condition often develops after repeated ankle sprains.

REVIEW OF LITERATURE

1. **El Sayed Mohamed Moneer Atta 2012: Balance Exercises and its Role in the Treatment of Chronic Ankle Instability; World Journal of Sport Sciences 6 (2): 95-101.**

The study suggests that balance is affected in people with ankle instability. The study also concluded that balance training improves the stability of balance. Balance exercises help to remove the pain of the ankle and helps in restoring the dynamic stability. Balance exercises worked to strengthen the muscles. The functional efficiency of the ankle also improved after the use of balance exercises.

2. Alyson Filipa, et al 2010: Neuromuscular Training Improves Performance on the Star Excursion Balance Test in Young Female Athletes, Journal of Orthopedic Sports of Physical Therapy; 40(9):551-558

The study demonstrated an improved performance on the star excursion balance test (SEBT) after NMTP that focused on lower extremity strength. And the star excursion balance test is an effective tool of measuring both the static and dynamic balance of the lower limb.

3. Diarmaid Fitzgerald, et al 2010: Effects of a Wobble Board-Based Therapeutic Examine System for Balance Training on Dynamic Postural Stability and Intrinsic Motivation Levels, Journal of Orthopedic Sports of Physical Therapy; 40(1):11-19.

Star excursion balance test scores showed a statistically significant improvement in the posteromedial and posterolateral direction. The findings suggest that exercising with the therapeutic examine system showed similar improvements in dynamic postural stability.

4. Santos MJ, Liu W et al 2008: Possible factors related to functional ankle instability. Journal of Orthopedic Sports for Physical Therapy; 38:150-157.

The study proposes that mechanical alterations in the ankle joint may influence several aspects of the ankle's functional ability. Alterations in the afferent processes, represented in this study by ankle proprioception, may affect the evertors' strength or vice versa. More importantly, individuals with functional ankle instability might exhibit high variability in ankle deficits.

5. McKeon PO, Hertel J 2008 Systematic review of postural control and lateral ankle instability, part I: can deficits be detected with instrumented testing. Journal of Athletic Training; 43(3):293-304.

The study concludes that instrumented postural control testing on stable force plates is better at identifying deficits that are associated with an increased risk of ankle sprain and that occur after acute ankle sprains than at detecting deficits related to chronic ankle instability.

6. Ingersoll CD, Kerrigan DC, et al 2008: Balance training improves function and postural control in those with chronic ankle instability. Medical Science of Sports Exercise; 40(10):1810-1819

The study suggests that a four weeks of balance training significantly improved self-reported function, static postural control as detected by TTB measures, and dynamic postural control as assessed with the SEBT. TTB measures were more sensitive at detecting improvements in static postural control compared with summary COP-based measures.

7. Marcos de Noronha, et al 2008: Relationship between Functional Ankle Instability and Postural Control. Journal of Orthopedic Sports of Physical Therapy; 38(12):782-789

The study concludes that there is a relationship between ankle instability with that of the postural control. Ankle control is affected in people with functional ankle instability in tasks of postural control after landing from a hop.

8. Scott E Ross, et al 2008: Assessment Tools for Identifying Functional Limitations Associated with Functional Ankle Instability Journal of Athletic Training. Jan-Feb; 43(1): 44–50.

The Ankle Joint Functional Assessment Tool (AJFAT) was an excellent assessment tool for discriminating between ankle groups. The AJFAT more accurately discriminated between groups. This tool is used to differentiate between a stable ankle with that of the unstable ankle.

9. Christopher R Carcia, et al 2008: Validity of the Foot and Ankle Ability Measure in Athletes with Chronic Ankle Instability Journal of Athletic Training. Mar-Apr; 43(2): 179–183.

The Foot and Ankle Ability Measure may be used to detect self-reported functional deficits related to chronic ankle instability. And the foot and ankle ability measure is a very effective tool to assess the functional impairments in ankle instability patients.

10. Hertel J et al 2008: Sensorimotor Deficits with Ankle Sprains and Chronic Ankle Instability. Clinical Sports Medicine; 27; 353-370

The study concludes that alterations in a spectrum of sensorimotor measures make it apparent that conscious perception of afferent somatosensory information, reflex responses, and efferent motor control deficits are present with ankle instability. The specific origin of these deficits local to the ankle ligaments or at the spinal or supraspinal levels of motor control have yet to be fully elucidated. It is clear, however, that both feedback and feedforward mechanisms of motor control are altered with ankle instability.

11. Hale SA, et al 2007: The effect of a 4-week comprehensive rehabilitation program on postural control and lower extremity function in individuals with chronic ankle instability. Journal of Orthopedic Sports of Physical Therapy; 37:303-311

The study results demonstrate postural control and functional limitations exist in individuals with CAI. In addition, rehabilitation appears to improve these functional limitations. There is evidence to suggest the star excursion balance test may be a good functional measure to monitor change after rehabilitation for ankle instability.

12. Hubbard TJ, et al 2007: Contributing factors to chronic ankle instability. Foot Ankle International; 28:343-354

The results of this study elucidate the specific measures that best discriminate between individuals with and without CAI. Both mechanical (anterior and inversion laxity) and functional (strength, dynamic balance) insufficiencies significantly contribute to the etiology of CAI. Prevention of CAI may be possible with proper initial management of the acute injury with rehabilitation aimed at those factors that best discriminate between individuals with and without CAI.

13. Hubbard TJ, et al 2007: Correlations among multiple measures of functional and mechanical instability in subjects with chronic ankle instability. Journal of Athletic Training; 42:361-366.

The study suggests that certain measures of functional instability were significantly correlated. Additionally, the significant correlations between measures of functional (balance, strength) and mechanical instability (laxity, hypomobility) demonstrate that the 2 factors are not completely dichotomous and need to be examined together.

14. Docherty CL, et al 2006: Postural control deficits in participants with functional ankle instability as measured by the balance error scoring system. Clinical Journal of Sports Medicine; 16:203-208.

The study suggests that postural control deficits were identified in participants with functional ankle instability. These deficits could be a contributing factor to the repeated episodes of instability and giving way that often occurs following an ankle sprain

15. Hubbard TJ, et al 2006: Mechanical contributions to chronic lateral ankle instability. Sports Medicine; 36:263-277.

The study shows the development of repetitive ankle sprains and persistent symptoms after injury has been termed chronic ankle instability. One of the purported causes of ankle instability is mechanical ankle instability. Mechanical ankle instability results in abnormal ankle mechanics. Both hypermobility and hypomobility may change a joint's axis of rotation and result in abnormal joint mechanics. Assessment and treatment should focus on both hypermobility and hypomobility and although injury may seem to be isolated to the talocrural joint, the inferior tibiofibular and subtalar joints should also be thoroughly examined.

16. Brandi L. et al 2006: Proprioceptive exercises balance ankle stability and activity; Biomedicals October 2006: 1-6

The study concludes that Chronic ankle instability, sometimes is associated with multiple ankle sprains, can lead to difficulty with walking, running, jumping, and cutting and reduction in the overall functional activities. Although functional instability can lead to impaired performance, the literature shows that proprioceptive exercise may help with overall balance.

17. Verhagen E, et al 2004: The effect of a proprioceptive balance board training program for the prevention of ankle sprains: a prospective controlled trial. American Journal of Sports Medicine; 32:1385-1393.

Based on the results of this study, it is evident that postural sway can be improved in subjects with functional instability of the ankle following 4 weeks of coordination and balance training. Balance and coordination training should continue to be an integral part of rehabilitation protocols.

18. Tropp H. et al 2002: Commentary: functional ankle instability revisited. Journal of Athletic Training; 37:512-515.

The study reviews that a local mechanoreceptor injury or muscle-strength imbalance contributes to chronic ankle instability and impairment in functional activities, but coordination training and proprioceptive training are clearly the treatments of choice and can

help prevent recurrent sprains. Balance training also plays an important role in improving balance.

19. Riemann BL et al 2002: Is there a link between chronic ankle instability and postural instability? Journal of Athletic Training; 37:386-393.

The conclusion of study is that postural instability is potentially more important. The issue of whether postural control becomes disrupted as a result of ankle injury is the effect on the selection of sensory and motor strategies leading to balance impairments and that thereby leading to functional activities impairment.

20. Mattacola et al 2002: Rehabilitation of the Ankle After Acute Sprain or Chronic Instability: Journal of Athletic Training; 37(4): 413–429.

He stated that Rehabilitation of ankle injuries should be structured and individualized. In the acute phase, the focus should be on controlling inflammation, reestablishing full range of motion, and gaining strength. Once, pain-free range of motion and weight bearing have been established, balance-training exercises should be incorporated to normalize neuromuscular control. Advanced-phase rehabilitation activities should focus on regaining normal function.

21. Loram ID et al 2002: Human balancing of an inverted pendulum: Journal of Physiology; 540:1111-1124

The study suggests that using the ankle musculature, subjects balanced a large inverted pendulum. The equilibrium of the pendulum is unstable and quasi-regular sway was observed like that in quiet standing.

22. Craig R. Denegar, et al 2002: The Effect of Lateral Ankle Sprain on Dorsiflexion Range of Motion, Posterior Talar Glide, and Joint Laxity Journal of Orthopedic and Sports Physical Therapy. 2002; 32(4):166-173.

In this study, residual ligamentous laxity was commonly found following lateral ankle sprain. Dorsiflexion range of motion was restored in the population studied despite evidence of restricted posterior glide of the talocrural joint. Although restoration of physiological range of motion was achieved, residual joint dysfunction persisted.

23. Simoneau GG, et al 2001: Biomechanics of elastic resistance in therapeutic exercise programs. Journal of Orthopedic Sports of Physical Therapy; 31:16-24

The study concludes that there are advantages in using elastic material for purposes of strengthening exercises and also helps in controlling the progression of the exercise program and also helps in attaining self built resistance by the patient. These elastic material help is attributing the resistance offered by the patient in performing strengthening exercises.

24. Hertel J, et al 2001: Serial Testing of Postural Control after Acute Lateral Ankle Sprain. Journal of Athletic Training Dec; 36(4):363-368.

This study identifies subjects' changes in postural control during single-leg stance in the 4 weeks after acute lateral ankle sprain. Postural control was significantly impaired in the injured limbs at day 1 and during week 2 after lateral ankle sprain. Consistent improvement in postural control measures on both injured and uninjured limbs was seen throughout the 4 weeks after ankle sprain.

25. McKay GD, et al 2001: Ankle injuries in basketball: injury rate and risk factors. British Journal of Sports Medicine; 35:103-108

The study reviews that ankle injuries occurred at a rate of 3.85 per 1000 participations. The three identified risk factors, and landing, should all be considered when preventive strategies for ankle injuries. Ankle injuries are said to be most common in active individuals and in individuals related to outdoor sports.

26. Eric eils et al 2001: A multi-station proprioceptive exercise program in patients with ankle instability. Medical Science for Sports Exercise; 33: 1991-1998

Based on the present results, a multi-station proprioceptive exercise program can be recommended for prevention and rehabilitation of recurrent ankle inversion injuries. The multi-station proprioceptive exercise program led to significant improvements of proprioceptive capabilities in chronically unstable patients. The main advantage compared with other programs is the relatively low training frequency.

27. Hertel J, Denegar R, et al 1999: Talocrural and subtalar joint instability after lateral ankle sprain. Medical Science of Sports Exercise; 31:1501-1508.

The data of the study suggest the existence of a subpopulation of patients with a history of LAS who demonstrate a pattern of combined talocrural and subtalar laxity. The talocrural and the subtalar ligament laxity are the most common in individuals following lateral ankle sprain and this ligament laxity may be a factor leading to ankle instability.

28. Holme E, et al 1999: The effect of supervised rehabilitation on strength, postural sway, position sense and re-injury risk after acute ankle ligament sprain. Scandinavian Journal of Medicine and Science in Sports; 9:104-109.

The study proposes the effect of an early rehabilitation program, including postural training, on ankle joint function after an ankle ligament sprain was investigated prospectively. These data showed that an ankle injury resulted in reduced ankle strength and postural control. However, the findings demonstrated that supervised rehabilitation may reduce the number of re-injuries, and therefore may play a role in injury prevention.

29. Rozzi SL, et al 1999: Balance training for persons with functionally unstable ankles. Journal of Orthopedic Sports of Physical Therapy; 29:478-4

This study suggests that balance training is an effective means of improving joint proprioception and single-leg standing ability in subjects with unstable and nonimpaired ankles. Balance training plays a very major and an important part in improving balance as well as improving functional performance ability.

30. Docherty CL, et al 1998: Effects of strength training on strength development and joint position sense in functionally unstable ankles. Journal of Athletic Training; 33:310-314.

The result of the study was that Ankle-strengthening exercises improved strength, inversion JPS, dorsiflexion JPS, and plantar flexion JPS in subjects with functionally unstable ankles. Ankle strengthening exercises for plantarflexor, dorsiflexors, invertors and evertors will improve ankle strength and thereby improving functional ability.

31. Julie N. Bernier et al 1998: Effect of Coordination Training on Proprioception of the functionally Unstable Ankle. Journal of Orthopedic and Sports Physical Therapy; 27(4):264-275.

Based on the results of this study, it is evident that postural sway can be improved in subjects with functional instability of the ankle following 6 weeks of coordination and

balance training. Balance and coordination training should continue to be an integral part of rehabilitation protocols.

32. Bahr R, Bahr IA1997: Incidence of acute volleyball injuries: a prospective cohort study of injury mechanisms and risk factors. Scandinavian Journal of Medicine and Science in Sports; 7:166-171

The study suggests that ankle sprains are the most common injuries accounting for about half of all injuries and with an incidence of about one per 1000 player hours. Ankle sprains mainly result from technical errors during take-off and landing after blocking and attacking, but previous ankle injury is the main risk factor.

33. Hoffman M, et al 1995: The effects of proprioceptive ankle disk training on healthy subjects. Journal of Orthopedic Sports of Physical Therapy; 21:90-93.

According to research, proprioceptive training enables injured subjects to reduce proprioceptive deficits and increase postural control. Proprioceptive ankle disk training significantly decreased postural sway in both the medial-lateral and anterior-posterior directions.

34. Gauffin, et al 1988: Effect of ankle disk training on postural control in patients with functional instability of the ankle joint. International Journal of Sports Medicine; 9:141–144

The study attributed that there was improvement in postural control after ankle disk training. The study has also emphasized the importance of ankle disk training for ankle instability. The postural control with functional instability (FI) of the ankle joint, i.e., recurrent sprains and or a feeling of giving way, was studied before and after ankle disk training. In the present study, we found increased postural sway with functional instability, was found to be improved after ankle disk training.

35. Balduini, et al 1982: Historical perspectives on injuries of the ligaments of the ankle. Clinical Sports Medicine; 1:3–12

As is readily apparent, there is not a consensus regarding the treatment of lateral ligamentous ruptures of the ankle. Certainly, the elimination of functional instability is the goal of treatment. It appears that degenerative changes can result from mechanical instability.

Treatment regimen will provide the most consistent results with the least incidence of functional instability.

36. Nashner LM et al 1976: Adapting reflexes controlling the human posture. Experimental Brain Research 26:59-72.

The intent of this study was to discover the stabilizing role of stretch reflexes acting upon the ankle musculature while human subjects performed stance tasks requiring several different postural sets. And the study concludes that appropriate reflexes should come in to play in maintaining the effective posture.

37. Freeman MA, et al 1965: The etiology and prevention of functional instability of the foot. Journal of Bone Joint Surgeries; 47:678-685.

The study concluded: a) that ligamentous injuries at the foot and ankle frequently produce a proprioceptive deficit affecting the muscles of the injured leg; b) that such a deficit is responsible for the symptom of "giving way" of the foot; and c) that the incidence of both the proprioceptive deficit and the symptom of "giving way" can substantially be reduced by treatment after injury with the coordination exercises described in this study.

METHODOLOGY

3.1 STUDY SETTING

Clinical setting

3.2 STUDY DESIGN

Experimental study.

3.3 POPULATION OF STUDY

Chronic ankle sprain

3.4 SAMPLE SIZE

30 subjects

3.5 SAMPLING TECHNIQUE

Simple random sampling method

3.6 INCLUSION CRITERIA

1. Both male and female patients
2. Age 20-40yrs
3. A history of at least one unilateral ankle sprain with pain and/or limping for greater than one day
4. Multiple episodes of the ankle giving way within the past 12 months
5. self reported giving way of the involved ankle in the last 6 months
6. pain or instability attributed to initial injury

3.7 EXCLUSION CRITERIA

1. Bilateral ankle sprain
2. Prior balance training
3. History of balance disorder
4. History of fracture or surgeries to the foot, ankle and lower limb
5. Equilibrium dysfunction
6. Neurological disorder

3.8 TOOLS AND MATERIALS USED



Measuring tape
bands



Stop watch



Various levels of thera

3.8 PROCEDURE

Thirty subjects both male and female with unilateral ankle sprain who fulfilled the inclusion and exclusion criteria should be evaluated through standardized history and physical examination. The star excursion balance test values for balance and the percentage of functional disability for the ankle joint should be recorded before the treatment. The subjects were advised to follow the exercise protocol for chronic ankle sprain. The star excursion balance test values for balance and the percentage of functional disability for the ankle joint should be recorded at the end of four weeks as post test values. Then both the pre test and post test values are tabulated and statistically analyzed.

PRE TEST

STAR EXCURSION BALANCE TEST

The star excursion balance tests (SEBTs) are functional tests that incorporate a single-leg stance on one leg with maximum reach of the opposite leg. The star excursion balance test are performed with the subject standing at the center of a grid placed on the floor, with 8 lines extending at 45° increments from the center of the grid. The 8 lines positioned on the grid are labeled according to the direction of excursion relative to the stance leg: anterolateral (AL), anterior (A), anteromedial (AM), medial (M), posteromedial (PM), posterior (P), posterolateral (PL), and lateral (L). The grid was constructed using a protractor and 3-in (7.62-cm)-wide adhesive tape and was enclosed in a 182.9-cm by 182.9-cm square on the hard tile floor.

A verbal and visual demonstration of the testing procedure was given to each subject by the examiner. Each subject performed 6 practice trials in each of the 8 directions for each leg to become familiar with the task. . To perform the SEBTs, the subject maintained a single-leg stance while reaching with the contra lateral leg (reach leg) as far as possible along the appropriate vector. The subject lightly touched the furthest point possible on the line with the most distal part of the reach foot. The subject was instructed to touch the furthest point on the line with the reach foot as lightly as possible in order to ensure that stability was achieved through adequate neuromuscular control of the stance leg. The subject then returned to a bilateral stance while maintaining equilibrium. The examiner manually measured the distance from the center of the grid to the touch point with a tape measure in centimeters. Measurements were taken after each reach by the same examiner.

Three reaches in each direction were recorded. Subjects were given 15 seconds of rest between reaches. The average of the 3 reaches for each leg in each of the 8 directions was calculated. Reach leg (right, left), order of excursions performed (clockwise, counterclockwise), and direction of the first excursion (A, M, L, P) were counterbalanced to control for any learning or order effect. All trials were then performed in sequential order in either the counterclockwise or clockwise directions.

Trials were discarded and repeated if the subject (1) did not touch the line with the reach foot while maintaining weight bearing on the stance leg, (2) lifted the stance foot from the center grid, (3) lost balance at any point in the trial, or (4) did not maintain start and return positions for one full second. In other words, if the reach foot was used to widen the base of support, the trial was not recorded.



Layout of Star Excursion Test

THE FOOT AND ANKLE DISABILITY INDEX

The Foot and Ankle Disability Index is also a tool which is in a questionnaire pattern which is being dually filled by the patient himself. The Foot and Ankle Disability Index (FADI) is a region-specific self-report of function. The Foot and Ankle Disability Index is a 34-item questionnaire divided into two subscales: the Foot and Ankle Disability Index and the Foot and Ankle Disability Index Sport. The FADI has 26 items, and the FADI Sport has 8. The FADI contains 4 pain related items and 22 activity related items. Each of the 34 items is scored on a 5-point Likert scale from 0 (unable to do) to 4 (no difficulty at all). The 4 pain items of the FADI are scored 0 (none) to 4 (unbearable). The FADI has a total point value of 104 points, whereas the FADI Sport has a total point value of 32 points. The FADI and FADI Sport are scored separately as percentages, with 100% representing no dysfunction.

The foot and ankle disability index was designed to assess functional limitations related to foot and ankle conditions. Hale and Hertel advocate the use of the FADI and FADI Sport self-report instruments in clinical care and research applications in young adults with CAI.

Eechaute et al concluded that the FADI and FAAM were the most appropriate evaluative instruments to quantify functional disabilities in athletes with chronic ankle instability. An advantage of the FADI and FAAM is that they both have a sports subscale in addition to an activities of daily living subscale.

METHOD OF USE OF THE FOOT AND ANKLE DISABILITY INDEX

Each of the 34 items is scored on a 5-point Likert scale from 0 to 4. The FADI has a total point value of 104 points, whereas the FADI Sport has a total point value of 32 points. The FADI and FADI Sport are scored separately and then transformed into percentages.

EXERCISE PROTOCOL

Rehabilitation exercises, such as an ankle disk, weight training, elastic resistance exercises, and foam exercises to rehabilitate the ankle joint. Elastic tubing and elastic bands are often used in therapeutic exercise programs. There are many inherent advantages of elastic resistance exercises: ease of use, low cost, they are highly versatile and finally they impose a weight bearing overload on the joint to be rehabilitated. Physical therapists often use elastic tubing exercise in conjunction with other rehabilitation exercises to promote ankle strength and balance in patients with recurrent ankle sprains. When utilizing elastic resistance exercise to rehabilitate a chronically unstable ankle, the unaffected ankle is attached to the elastic tubing and the affected ankle experiences a weight-bearing overload to resist against the perturbation force. To maintain balance in response to the balance-disrupting unstable ankle foot (exercise CAI group) force imposed by elastic tubing, the weight-bearing ankle must actively resist in the opposite direction against the imposed perturbation. Elastic tubing exercises for the exercise group consisted of 4 different exercises: front pull, back pull, crossover, and reverse crossover. Subjects assigned to the exercise group made 3 visits per week, every other day for 4 weeks, to perform the elastic tubing exercises. Each exercise consisted of 3 sets of 15 repetitions, with the chronically unstable ankle foot. Initially the exercises are started with the least resistance band later on progressing to different levels of resistance.

1. Front Pull:

The subject faced away from the fixed attachment of the elastic tubing so that the tubing pulled the subject backward. Each subject stood on the affected foot with the unaffected foot positioned behind the affected foot with the hip and knee extended. While balancing on the affected foot, the subject flexed the unaffected hip and knee, pulling the tubing forward. The subject then slowly returned to the starting position.

2. Back Pull :

The subject faced toward the fixed attachment of the elastic tubing, so that the tubing pulled the subject forward. The subject stood on the affected foot, with the unaffected foot positioned ahead of the affected foot with the hip and knee flexed. While balancing on the affected foot, the subject extended the uninjured lower extremity at the hip and knee, pulling the tubing backward. The subject then slowly returned to the starting position. The subject stood on the affected foot, flexing the unaffected lower extremity at the hip and knee, while pulling the tubing backward (A to B), then slowly returned to the starting position (B to A).

3. Crossover:

The subject stood perpendicular to the fixed attachment of the elastic tubing, so that the unaffected foot was closer to the fixed attachment, with the feet slightly wider than

shoulder width apart. The subject stood on both the affected and unaffected lower extremities, with hip and knees flexed. While balancing on the affected foot, the subject adducted the hips by crossing the unaffected foot in front of the affected foot. The subject then slowly returned to the starting position.

4. Reverse Crossover:

The subject stood perpendicular to the fixed attachment of the elastic tubing. The subject's unaffected foot was closer to the fixed attachment with the hips adducted and lower extremities crossed so that the unaffected foot was in front of the affected foot. The subject stood on both the affected and unaffected lower extremities with hips and knees flexed. While balancing on the affected foot, the subject abducted the hip until the feet were slightly wider apart than shoulder width. The subject then slowly returned to the starting position.

DATA ANALYSIS AND INTERPRETATION

4.1 STATISTICAL METHOD

The collected data were tabulated and analyzed by using descriptive and inferential statistics. The data was analyzed by paired t-test. The Statistical package for social sciences (SPSS) package was used to calculate and analyze the above mentioned descriptive and inferential statistics.

1. To assess all parameters descriptive statistics like mean and standard deviation were used.

- **Mean:**

$$\bar{d} = \frac{\sum d}{n},$$

Where $\sum d$ is the summation of difference in is the no of samples

Standard Deviation:

$$SD = \sqrt{\left(\frac{\sum d^2}{n}\right) - \left(\frac{\sum d}{n}\right)^2},$$

Where d is difference between pre and post treatment values

n is no of samples

2. To find the changes that occurred in the same group during study measure of inferential statistics called paired 't' test was used.

- 't' test formula:

$$t = \frac{\bar{d}}{\left(\frac{s}{\sqrt{n-1}} \right)},$$

Where \bar{d} is Mean of Samples

s is Standard Deviation

$\sqrt{n-1}$ Is Degrees of Freedom

The calculated values t – values is then compared with standard tabulated t a n-1 value where a is the level of significance which is usually maintained at 95%.

4.2 DESCRIPTION AND STATISTICAL ANALYSIS

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pre test values for Star Excursion Balance Test	48.3843	30	7.79404	1.42299
	Post test values for Star Excursion Balance Test	51.2613	30	7.24416	1.32260
Pair 2	Pre test values for Foot and Ankle Disability Index	60.9000	30	8.36392	1.52704
	Post test values for Foot and Ankle Disability Index	55.5333	30	8.11866	1.48226

Paired Samples Correlations:

Ho: There is no significant relationship between the Pre and Post outcome measurements.

H1: There is a significant relationship between the Pre and Post outcome measurements.

Paired Samples Correlations				
		N	Correlation	Sig.
Pair 1	Pre test values for Star Excursion Balance Test & Post test values for Star Excursion Balance Test	30	.837	.000
Pair 2	Pre test values for Foot and Ankle Disability Index & Post test values for Foot and Ankle Disability Index	30	.962	.000

Inference:

From the above table, it shows the value of p is less than .05. So we reject the Ho. It may be conclude that the Pair 1 and Pair 2 Pre and Post outcome measurements are High Positively correlated with their Measurements.

4.3 TABULATION WITH INTERPRETATION

Paired Sample t – test: 1

Ho: There is no significance difference between the Pre and Post test values for Star Excursion Balance Test.

H1: There is a significance difference between the Pre and Post test values for Star Excursion Balance Test.

The level of Significance is 5%.

Paired Samples Test									
		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Pre test values for Star Excursion Balance Test - Post test values for Star Excursion Balance Test	-2.87700	4.32659	.78992	-4.49258	1.26142	-3.642	29	.001

Inference:

From the above table clearly shows that the value p is less than 0.05. So, we reject the null hypothesis. It may be conclude that there is a significance difference between the Pre and Post test values for Star Excursion Balance Test.

Paired Sample t – test: 2

Ho: There is no significance difference between the Pre and Post test values for Foot and Ankle Disability Index.

H1: There is a significance difference between the Pre and Post test values for Foot and Ankle Disability Index.

The level of Significance is 5%.

Paired Samples Test									
		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 2	Pre test values for Foot and Ankle Disability Index - Post test values for Foot and Ankle Disability Index	5.36667	2.28161	.41656	4.51470	6.21863	12.883	29	.000

Inference:

From the above table clearly shows that the value p is less than 0.05. So, we reject the null hypothesis. It may be conclude that there is a significance difference between the Pre and Post test values for Foot and Ankle Disability Index.

4.4 GRAPHICAL REPRESENTATION

Table- 1

Measurements	Mean	Std. Deviation
Pre test values for Star Excursion	48.3843	7.79404

Balance Test		
Post test values for Star Excursion Balance Test	51.2613	7.24416

Chart -1

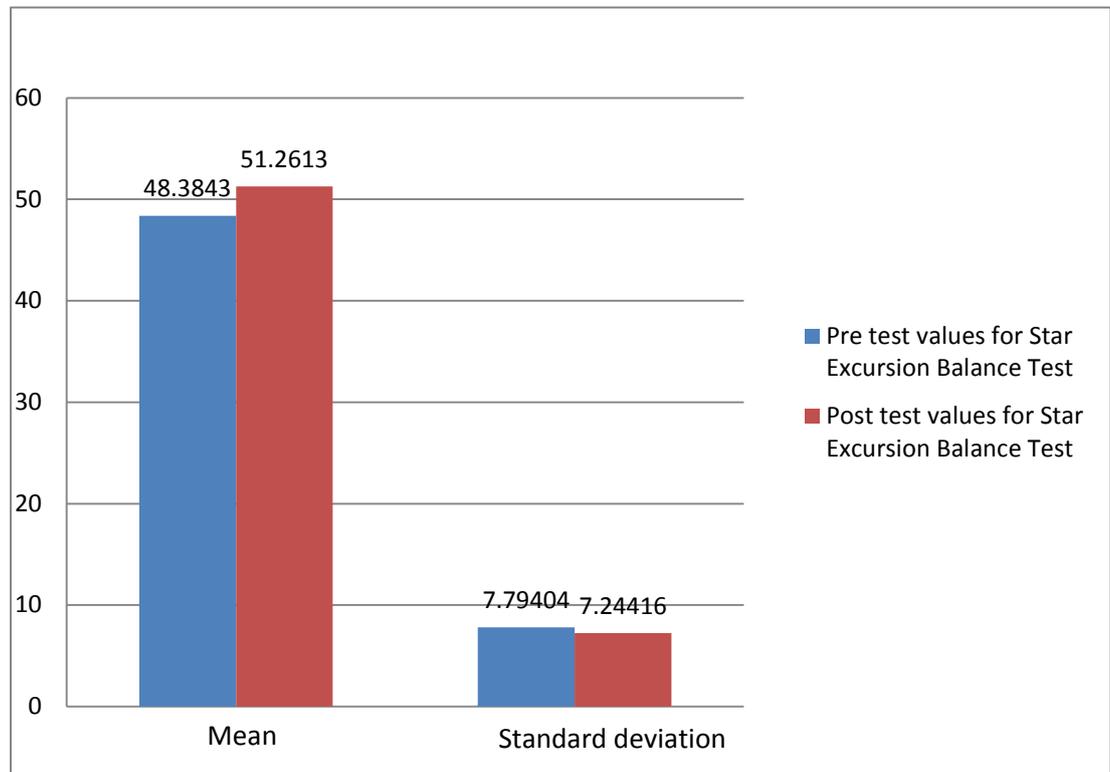


Table -2

Measurements	Mean	Std. Deviation
Pre test values for Foot and Ankle Disability Index	60.9	8.36392
Post test values for Foot and Ankle Disability Index	55.5333	8.11866

Chart – 2

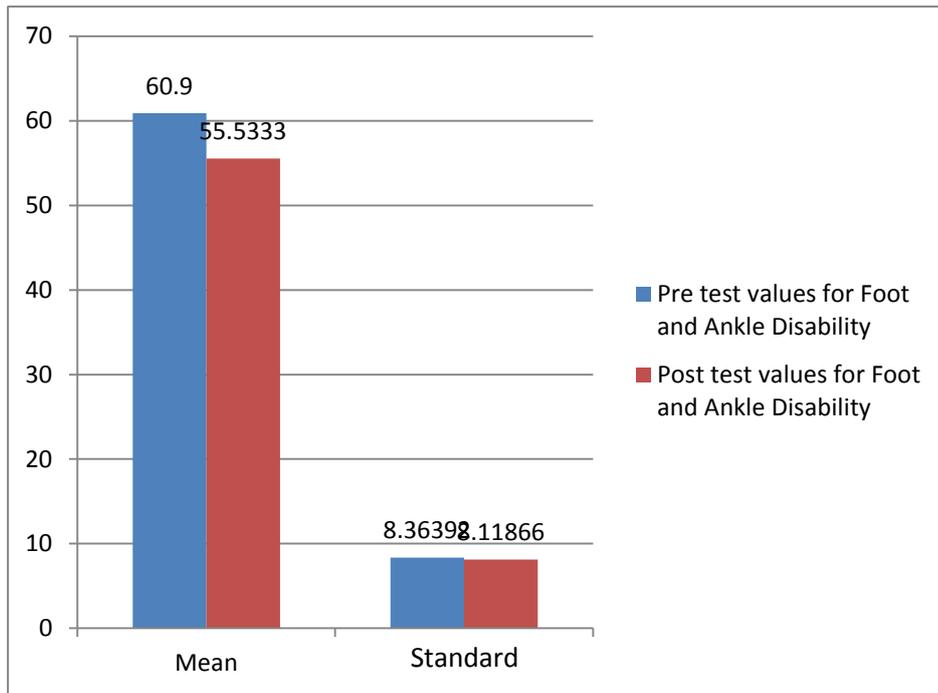


Table 3

Measurement	Mean
Pre test value for Star Excursion Balance Test	48.3843
Post test value for Star Excursion Balance Test	51.2613

Chart 3

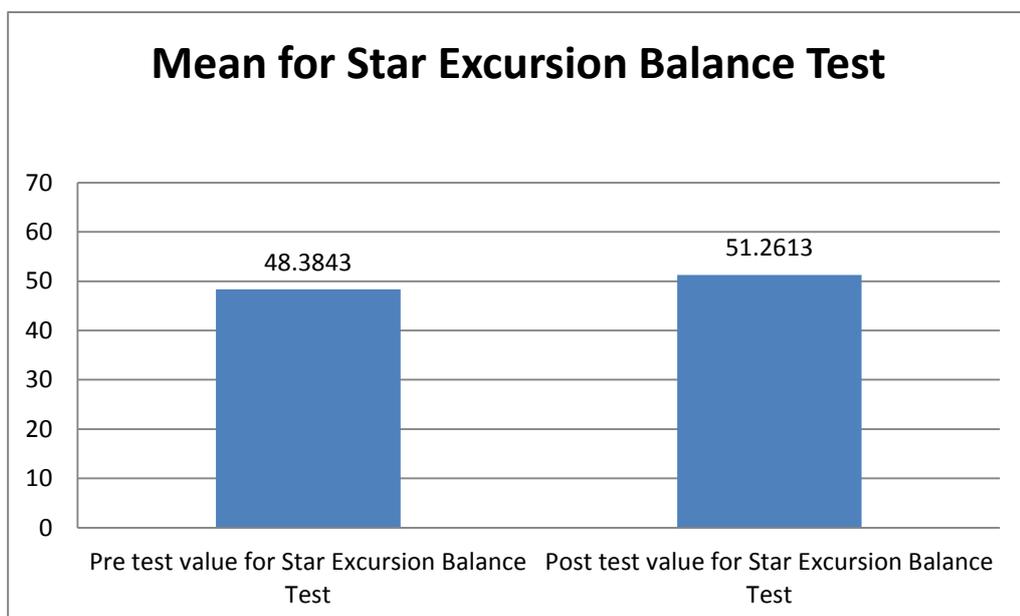
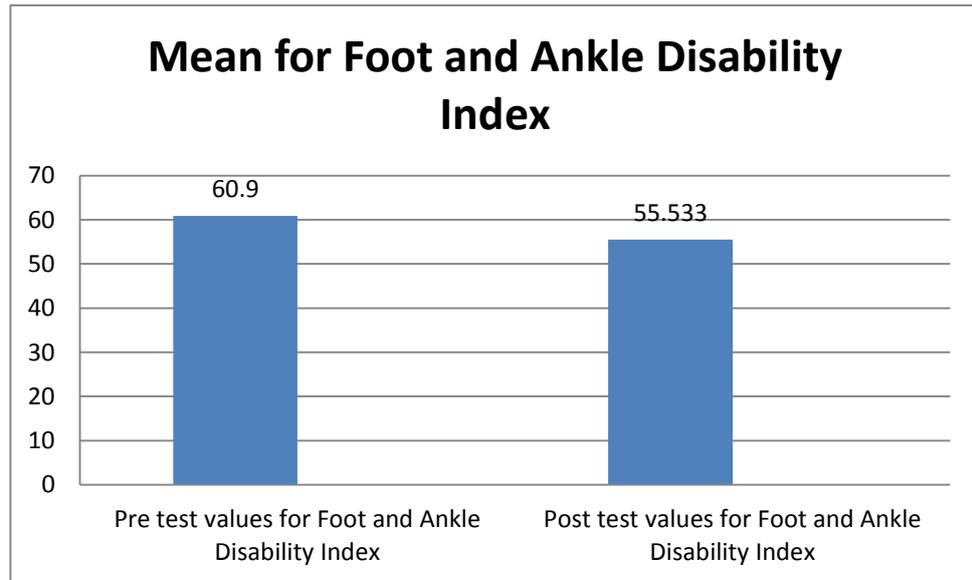


Table 4

Measurement	Mean
Pre test value for Foot and Ankle Disability Index	60.9
Post test value for Foot and Ankle Disability Index	55.533

Chart 4



4.5 RESULT

In this study there is a significant increase in the values of the Star Excursion Balance Test from a mean value of 48.38cm to a mean value of 51.26 cm. The Foot and Ankle disability values have found to be decreased from a mean value of 60.6 to a mean value of 55.53.

From the above table it shows that the value p is less than 0.05, so the null hypothesis is rejected. It may be decided that there is a significant difference exists in the pre and post measurements values and also infer that the intervention is effective in improving the balance and activities of daily living in chronic instability individuals.

DISCUSSION

The goal of this study is to determine the effects of a 4-week elastic resistance exercise program on balance and the improvement of activities of daily living in individuals with a history of ankle sprains. In the study of Mattacola et al²⁰ used elastic resistance exercises in rehabilitation because they enable the clinician to utilize a safe and effective weight-bearing progressive overload to rehabilitate the injured patient.

When using elastic resistance to rehabilitate an injured joint, the clinician can easily adjust the resistance in small increments to match the patient's progress by increasing or decreasing the stretch of the elastic tubing. Elastic resistance exercises have been primarily used by Docherty for shoulder, knee, and ankle joints rehabilitation.

Most ankle rehabilitation programs utilize a combination of strengthening exercises in conjunction with coordination exercises. The perturbation imposed by the elastic resistance exercise would elicit improvements in balance. The elastic resistance exercise program was equally effective in improving balance in subjects with and without a history of ankle sprains. The elastic resistance exercises utilized in this training program impose a postural control challenge that ankle, knee, and hip joints of the support limb must effectively resist to maintain balance. Balance is the ability to maintain upright posture while keeping the center of gravity within the base of support. To maintain balance in response to the balance disrupting force imposed by elastic tubing, the weight bearing ankle must actively resist in the opposite direction against the imposed perturbation.

Mechanoreceptors provide information to the three movement systems, which aid in the regulation of balance. The myotatic stretch reflex is the first mechanism to react at approximately 40 msec. An externally imposed rotation or increased load to the joint triggers muscle spindles to increase activity in the muscle and improve muscle stiffness properties. Muscle stiffness is described as the muscle's resistance to stretch and is dependent upon the level of activation of the muscle. Therefore, other movement systems which rely on alternate input are required to maintain balance.

The second system, which is the first effective response to control balance, comes from the automatic systems. They too are triggered by external perturbations. The response is somewhat slower than the myotatic stretch reflexes at 90-100 msec. Somatosensory input results in automatic responses which are governed by the degree of intensity of the stimulus in combination

with the individual's past experiences. The third system involved in balance control is the voluntary system. It is the slowest responding system at approximately 150 msec. Voluntary and automatic responses are often used in conjunction with each other, with automatic responses occurring first followed by voluntary purposeful behaviors.

Because the human body is not statically stable even during quiet double-limb stance, the central nervous system must constantly make adjustments to keep the center of mass over the base of support. Loram and Lakie²¹ in their study recently suggested that the central nervous system utilizes a “throw-and catch” pattern to generate joint torques on opposite sides of the joint to maintain equilibrium while standing. In this study, subjects were required to maintain balance while resisting against the balance disturbing force caused by the tension in the elastic tubing. It is possible that the perturbation caused by the elastic tubing imposes an accentuated neural training effect similar to the throw-and-catch pattern proposed by Loram and Lakie.

Future research on the putative training mechanism caused by elastic resistance exercise would require analyzing both joint kinetics and muscle activation during the elastic resistance exercise. The balance perturbation provided by the elastic tubing exercises caused the weight-bearing ankle to resist forces causing inversion, eversion, dorsiflexion, and plantar flexion about the ankle joint. Clinical evidence has shown that balance training is effective in reducing the recurrence of ankle sprains. The underlying neural mechanisms of clinical observations of improving balance was being described in the study of Hertel.²⁴ He suggested that balance or postural control training might impose a neural stimulus that causes the central nervous system to “retune” input and output processing of somatosensory information necessary to control balance.

Freeman et al may have been the first to demonstrate that balance training using a tilting balance platform improves balance in individuals with functionally unstable ankles.

Eils²⁶ reported a significant reduction in TTD of CoP following a 6-week multistation proprioceptive exercise program in patients with ankle instability. The exercise program utilized by Eils and Rosebaum included elastic Thera-Bands in conjunction with uneven walkways, inversion boards, and a variety of additional proprioceptive rehabilitation exercises.

There are very few ankle rehabilitation training studies that have used exclusively elastic resistance exercises. In a study by Docherty et al subjects with functionally unstable ankles showed an increase in dorsiflexion and inversion strength and an improvement in inversion and plantar flexion joint position sense following training.

In the study by Gaufin et al subjects trained for 8 weeks on an ankle disc. They report an improved pattern of balance control. This was evident in the injured limb as well as in the uninjured, untrained limb. Gaufin et al proposed that this improvement implicated central motor control rather than peripheral proprioceptive control. If this theory holds true, it would be expected that the balance and coordination training in our study would improve measures of balance but would have no effect on the peripheral afferent receptors of the ankle and, thus, no effect on joint position sense.

The research study of Brandi L. Ross, on the topic of Proprioceptive exercises balance ankle stability and activity, concluded the study as Chronic ankle instability, sometimes is associated with multiple ankle sprains, can lead to difficulty with walking, running, jumping, and cutting and reduction in the overall functional activities. Although functional instability can lead to impaired performance, the literature shows that proprioceptive exercise may help with overall balance.

CONCLUSION

This study shows that balance training program using Thera tube can improve the balance and activities of daily living in individuals with ankle instability and this increase may be mediated in performing their functional activities. Balance was improved in individuals with a history of multiple ankle sprains using a 4-week elastic tubing exercise program, in which resistance movements were performed. Elastic resistance rehabilitation exercises do cause a reduction of functional instability and reduction in reoccurrence of ankle sprains

LIMITATIONS AND SUGGESTIONS

LIMITATIONS

- The study duration is very short.

- The population of the study is small
- The subjects taken were between age group 20-35 years
- The long lasting effect of balance is not permanent(once the balance training is discontinued the effects are deteriorating)

SUGGESTIONS

- The study can be done for a longer duration
- A larger population can be studied

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ABSTRACT

“Effect of 4 week on two passive stretch maneuvers on pectoralis minor length and scapular kinematics among collegiate swimmer”

Arpit Kamboj*, Dr. Saleem Akhtar Naqvi(PT) , Dr.Aashish Jain(PT)*****

Arpit Kamboj, MPT (SPORTS), **Dr. Saleem Akhtar Naqvi MPT(Ortho) Dean & Principal, MGUMST, Jaipur, *Dr. Aashish Jain MPT(Sports) Asst. Prof. MGUMST, Jaipur.**

Background & objective: Swimming is a sport enjoyed by all ages. Approximately 100 million Americans consider themselves swimmer, making swimming the most popular sport in the united states. Some of these people swim competitively, other swim for fitness, and other for reaction. Swimming can be done safely by people with musculoskeletal systems that cannot withstand the impact forces found in running, jogging or jumping. Swimming is also highly regarded as an aerobic activity. Competitive swimmers may cover 10,000 to 14,000 meters a day 6 to 7 days a week. Some distance swimmers may swim up to 24,000 meters a day. This equates to 16,000 shoulder revolutions per week.

Swimming is an unusual sport in that the shoulders and upper extremities are used for locomotion, while at the same time requiring above average shoulder flexibility and range of motion (ROM) for maximal efficiency.

This is often associated with an undesirable increase in joint laxity. Furthermore, it is performed in a fluid medium, which offers more resistance to movement than air.

This combination of unnatural demands can lead to a spectrum of overuse injuries seen in the swimmer's shoulder, the most common of which is rotator cuff tendinitis and pectoralis minor tightness. Observation of the scapular posture is one of the most important component of the physical examination in overhead athletes.

Design of study: Experimental study.

Methods: A convenience sample of 30 swimmers subject divided into two group, Group A and Group B who fulfilled the inclusion criteria were included in the study. After the collection of demographic data, a detailed tightness of pectoralis minor was measured by inch tape method. The measurement were taken by standing the participant erect with resting his arm at their side. The distance was taken between origin and insertion of the muscle. The scapular protraction was measured in three position of the shoulder joint i.e 0⁰, 45⁰, and 90⁰. The

lateral part of caliper was placed on top of inferior angle and medial part of scapula was placed on corresponding spinous process. The scapular measurement for maximum abduction was measured with gravity inclinometer, the device was placed in the root of spine of scapula. This position was established so that when subjects elevate his arm, their arm were raised in the scapular plane (40° anterior to the frontal plane) while maintaining the contact with the guide pole. The measurement is taken in the maximum elevation of the arm.

RESULT: After measurement of the pectoralis minor length the mean in 0 week for Group A($X=7.56$), Group B ($X=8.8$), and in 4th week for Group A($X=7.66$), GroupB ($X=9.65$) The mean of **ROTATION 90 UPWARDS** 0 week for Group A($X=15$), Group B

($X=11.9$) mean of **ROTATION 90 UPWARDS** 4th week for GroupA($X=16.33$),GroupB($X=15.46$)mean of **SCAPULAR PRET** 0 week for GroupA($X=8.38$),GroupB($X=8.162$)mean of **SCAPULAR PRET** 4th week for GroupA($X=8.48$),GroupB($X=8.54$)With t-value and p-value of **pcet minor length cm** on pre(0 week) is $t=0.02476$ and ($p>0.05$) t-value and p-value after 4th week is $t=3.275$ and($p<0.05$)With t-value and p-value of

ROTATION 90 UPWARDS on pre(o week) is $t=0.04057$ and ($p>0.05$) t-value and p-value after 4th week is $t=1.3096$ and($p<0.05$)With t-value and p-value of **SCAPULAR PRET** on pre(1st week) is $t=0.00276$ and ($p>0.05$) t-value and p-value after 4th week is $t=0.0034$ and($p<0.05$)Also the graphical representation of data clearly shows that as compared to group A Group B has significant difference in(pre-post session)in all three variable This shows that Group B has shown significant improvement than that of Group A.

Interpretation & conclusion: On comparison of group A and group B it was seen that there was no statistically significant difference between the pre intervention scores of Group A and Group B in the study of total 30 patients On comparison of Group A and Group B it was seen that there was a statistically significant difference in post intervention score between Group A and Group B

Key words: pectoralis minor tightness, scapular upward rotation and protraction.

Introduction

Competitive swimmers routinely swim six to seven days per week during the competitive season, reaching distances of six to eight miles per practice, which equates to approximately 2500 sequential shoulder revolutions per day.¹ As such, the scapular orientations and kinematics during humeral elevation tasks of swimmers can be altered due to changes of surrounding musculature including weakness, fatigue, and inflexibility.² Optimal shoulder function is closely associated with proper scapular orientation and motion.²⁻⁵ Therefore, it is vital that

any alterations to the periscapular musculature are addressed through preventative and rehabilitative interventions among such athletes.

Scapular dyskinesia has been associated with several shoulder pathologies, such as subacromial impingement syndrome,^{6,9} rotator cuff pathology,^{10,12} internal impingement,¹³ glenohumeral instability,^{14,15} and adhesive capsulitis.^{16,18} One specific cause of scapular dyskinesia may be an abnormally shortened pectoralis minor muscle.^{8,19} Diminished pectoralis minor flexibility prohibits optimal scapular kinematics, specifically in upward rotation, external rotation, and posterior tilting.^{20,21} Therefore, tightness of the pectoralis minor may be a contributing factor to various shoulder injuries, most frequently, subacromial impingement syndrome.^{6,8,22} Furthermore, tightness of the pectoralis minor may be more prevalent among swimmers due to the repetitive overhead nature of their sport.²³

Due to the potential for development of scapular dyskinesia and upper extremity injury when pectoralis minor tightness is present, stretching of the pectoralis minor muscle is

believed to be critical in the prevention and treatment of shoulder dysfunction. Various stretching techniques to lengthen the pectoralis minor are currently used in clinical practice.^{19,21} However, results of studies that have investigated optimal stretching techniques for the pectoralis minor are conflicting, which has caused increased confusion among researchers and clinicians.^{20,21,24,26}

Further investigations are necessary to determine how stretching exercises alone might acutely affect the length of the pectoralis minor, as well as the dynamic orientation of the scapula. Therefore, the purpose of this study is to compare the acute effects of two passive stretch maneuvers aimed at lengthening the pectoralis minor and the subsequent effects on scapular kinematics among a group of collegiate swimmers. The authors hypothesized that the passive stretching maneuvers utilized in this study would acutely change the length of the pectoralis minor muscle and affect scapular kinematics among a sample of collegiate swimmers to provide optimal congruence between the glenoid and the humeral head. The shoulder joint enjoys mobility at the cost of stability with respect to bony articulation. The shoulder complex is highly dependent upon soft tissue relationships to maintain joint congruency.

The interaction of these muscular ligaments and capsular structure leads to coordinated movements between the glenohumeral and scapulothoracic rhythm. During dynamic arm movement the scapula must move synchronously with the humerus. Contribution from the scapula has long been considered essential for normal shoulder function.

Concomitant changes including increased protraction or decreased upward rotations have been identified in the scapular motion of athletes.

The scapula has long been considered essential for normal shoulder function. Concomitant changes including increased protraction or decreased upward rotations have been identified in the scapular motion of athletes. A typical dysfunction pattern is when the scapula adopts a protracted and downwardly rotated position. This may increase tension and irritation on the upper limb neural system. It is also associated with an increased risk of impingement and increase laxity of the anterior glenohumeral structures. Awareness of and clinical test for the position and motion of scapula should be incorporated into the routine examination of the painful shoulder. Observation of the scapula posture is one of the most important components of the physical examinations in overhead athletes.

The knowledge of scapula kinematic function and evaluation is growing and understanding the role of scapula in shoulder function and dysfunction is evolving. Movement at the glenohumeral joint can take place in all directions: flexion and extension; abduction and adduction; internal and external rotation; and circumduction.

Each movement is brought about by different groups of muscles. Rotation of the humerus is accomplished by a group of four muscles, subscapularis, supraspinatus, infraspinatus and teres minor collectively called rotator cuff. These muscles originate on different parts of scapula, insert like a cuff around the perimeter of the humeral head, where the tendons blend with the joint capsule. In addition to externally and internally rotating the humerus, the rotator cuff helps stabilize the joint during abduction by pulling the humeral head into the glenoid fossa.

Scapular rotation is accomplished by the trapezius and serratus anterior muscles. Trapezius originates on the clavicle and the thoracic spine and inserts on the scapula. Scapular muscles for swimmers are the middle and lower serratus anterior muscles produce scapular upward rotations, posterior tilting and external rotation. Upper trapezius assists in medial stabilization and prevention of excess superior translation of the humeral head, as well as production of glenohumeral external rotation during arm elevation. It is important to assess the difference in static scapular position among swimmers to better understand the exact biomechanical changes in sports like swimming.

METHODOLOGY

Thirty healthy swimming athletes (age = 22.13 ± 2.16 years, height = $171.6 \text{ cm} \pm 6.38 \text{ cm}$, weight = $65.13 \pm 6.56 \text{ kg}$) participated in the study. All participants were in season at the time of data collection. Both left and right

shoulders of each subject were used for data collection. Shoulders of swimmers that had a recent history (past 2 months) of upper extremity injury or any history of upper extremity surgery were excluded from the study. Of the 30 subjects, 8 shoulders were excluded from analysis due to previous injury leaving 50 shoulders for final data analysis; control shoulders (n=15), focused stretch shoulders (n=15), gross stretch shoulders .

Instrumentation

A standard tape measure was used to measure pectoralis minor length. A gravity inclinometer was used to measure scapular kinematics, Scapular protraction was measured by vernier caliper.

Procedure:-

Testing occurred during a single session at the participating team's swimming facilities or within a biomechanics using a pre-test post-test design. Each shoulder was randomly assigned as either focused stretch shoulder, gross stretch shoulder, or control shoulder. All subjects read and signed an informed consent form approved by the institutional review board prior to participation. The study was conducted in accordance with the Helsinki declaration. Scapular kinematic data for the experimental shoulders (focused stretch, gross stretch) were measured immediately before and after an application of one of the two passive stretch treatments. Control shoulders received initial scapular kinematic measurements and post-intervention measurements after an approximate 1.5 minute rest period without receiving any form of treatment. This rest period was approximately the same amount of time necessary to apply the assigned stretch to the experimental shoulders.

Pectoralis Minor Length Measurement

To measure the length of the pectoralis minor participants were standing erect with their test arm resting at their side. A tape measure was used to measure the linear distance between the origin and insertion of the muscle. The primary investigator of the study performed all measurements. The origin was defined as the inferior aspect of the 4th rib, which was one finger width lateral to the sternum, just lateral to the sternocostal junction.

The insertion was defined as the medial-inferior aspect of the coracoid process. This method of measuring pectoralis minor length has previously been proven to be valid

- intraclass correlation coefficients between 0.82 to 0.87 when compared with measurements made using an electromagnetic tracking system.²⁷

Scapular Kinematic Measurement

The measurement is to be conducted in swimmers static scapular position. After a verbal description of the measurement procedure, the method is to be demonstrated to the subject. The measurement protocol utilized in this study for scapular upward rotation describe by Johnson. et al¹³. To measure the scapular upward rotation the root of the scapular spine will be identified and marked in rest. The left edge of the gravity inclinometer will be placed on this mark, and another mark will be placed where the right edge of the inclinometer rest on the scapula.

These mark ensure that the gravity inclinometer rested on the same location on the scapula in repeated measures. Than the glenohumeral joint is elevated, a vertical guided pole will be secure to the plinth, the standing position of the subjects will be standardized by lines marked on the floor. The position will be established so that when subjects elevates his arm, their arm would raise in the scapular plane (40° anterior to the frontal plane) while maintaining the contact with the guide pole. The measurement/reading is taken in the maximum elevation of the arm.

Scapular protraction measurement

Scapular protraction measurement will be taken with the participant standing with normal relaxed posture the measurement will be performed at three positions (0° , 45° , 90°) hands on hips and 90° of glenohumeral abduction with maximum internal rotation.

First the inferior angle of scapula will be palpated and lateral arm of the caliper will be placed at the top of the inferior angle. The medial arm of the caliper will be positioned at the corresponding spinous process, and the measurement will be recoded. This will be repeated three times and the measurement will be use

Pectoralis Minor Stretches

It is accepted that a passive stretch duration of 15 to 30 seconds and a frequency of 2 to 4 repetitions is appropriate for acutely improving flexibility.^{32,33} Thus, the focused and gross passive stretching interventions in this study were performed for two sequential repetitions, holding the stretches for 30 seconds, with a 30 second break between each stretch. The primary investigator applied all stretches at the end range of motion.

For the focused stretch shoulders, the authors placed each subject in a supine position with the test arm at their side while the primary investigator palpated medially into the proximal axilla, followed by proceeding superiorly towards the coracoid process. This maneuver allowed the investigator's fingers to be fixed posterior to the proximal end of the pectoralis minor muscle.

The investigator then applied pressure in the anterior direction, similar to attempting to lift the muscle, thereby applying tensile force directly to the pectoralis minor. The opposite hand of the investigator was used to stabilize the scapula and humeral head ([Figure 1](#)).

For the gross-stretch, subjects were positioned in the supine position with the test arm abducted and externally rotated to 90° and the elbow flexed to 90°. The investigator stabilized each subject's body by placing a hand on the contralateral coracoid. The investigator then passively, horizontally abducted the subject's shoulder.

Statistical Analyses

A Paired T test with repeated measures on time was utilized for comparison. Time (pre-, post-test) and shoulder assignment (control, focused stretch, gross stretch) were the independent variables. The dependent variables included a linear measurement of pectoralis minor length, as well as angular measurements of scapular upward/downward rotation, external/internal rotation, and anterior/posterior tilting. If a significant group-by-time interaction was found. Within-group effect size was calculated as (post-intervention mean – pre-intervention mean)/pre-intervention standard deviation. The effect size calculations provide an indication of clinical meaningfulness of changes among the dependent variables. Alpha level was set a priori at .05. All data were analyzed using SPSS software (Version 21.0, IBM Corp)

RESULT

Descriptive data for pre- and post-test pectoralis minor length and scapular kinematics of the two groups are summarized in [Tables 1-8](#). Pectoralis minor length showed a significant interaction effect ($p = .0028$). The effect size suggests that a small to moderate amount of the change in pectoralis minor length may be attributed to the treatment.

Table 1: Mean and SD OF pectoralis minor length for the Group A and Group B

Demographic data(pectoralis minor length cm)	GroupA	GroupB		
	Mean	sd	mean	Sd
AT 0 WEEK	7.56	0.59	8.8	1.146
AT 4TH WEEK	7.66	0.58	9.65	0.97
Demographic data(SCAPULAR UPWARDS ROTATION)	GroupA	GroupB		
	Mean	sd	mean	Sd
AT 0 WEEK	15	6.26	11.9	5.312
AT 4TH WEEK	16.33	5.97	15.46	4.824

Table 2: Mean and SD of scapular upwards rotation for the Group A and Group B

Table 3: Mean and SD of scapula protraction for the Group A and Group B

Demographic data(SCAPULAR PROTRACTION)	GroupA	GroupB		
	mean	sd	mean	Sd
AT 0 WEEK	8.38	5.51	8.162	0.67
AT 4TH WEEK	8.48	5.48	8.54	0.66
Variable- pct minor length cm	Group A	Group B		
	T value	P value	T value	P value
PRE vs POST SESSION	0.02476	0.98	3.275	0.0028

Table 4: comparison of mean value for pectoralis minor length between Group A and Group B

Variable- ROTATION 90 UPWARDS	Group A		Group B	
	T value	P value	T value	P value
PRE vs POST SESSION	0.04057	0.967	1.3096	0.200

Table 5: Comparison of mean value for scapula upwards rotation between Group A and Group B

Variable- SCAPULAR PROTRACTION	Group A		Group B	
	T value	P value	T value	P value
PRE vs POST SESSION	0.00276	0.997	0.0034	0.9973

Table 6: Comparison of mean value for scapula protraction between Group A and Group B

MEAN DIFF(pre-post)	GroupA		GroupB	
	Mean diff	sd	Mean diff	Sd
PECTORALIS MINOR LENGTH	0.093	0.143	0.853	0.366
SCAPULA UPWARDS ROTATION	1.333	2.288	3.3	2.234
SCAPULAR PROTRACTION	0.1	0.107	0.566	0.335

Table 7: Comparison of mean difference and SD between Group A and Group B

MEAN DIFF(pre-post)	Group A vs Group B	
	T value	P value
pcet minor length cm	1.212	0.235
ROTATION 90 UPWARDS	0.038	0.969
SCAPULAR PRET	0.0002	0.999

Table 8: comparison of mean difference between Group A and Group B

Comparison of mean value and standard deviation for age between Group A and Group B

Comparison of mean value and standard deviation for weight between Group A and Group B

35

Comparison of mean value and standard deviation for height between Group A and Group B

Comparison of mean for pectoralis minor length between Group A and Group B

36

Comparison of mean for upward rotation between Group A and Group B

Comparison of mean for scapular protraction between Group A and Group B

DISCUSSION

[Jeffrey G. Williams](#) et. al did the acute effect of two passive stretch maneuvers on pectoralis minor length and scapular kinematics among colligate swimmer. They found that the gross stretch shoulders had a significant increase in pectoralis minor length compared to the control shoulders ($P=.007$). There were no other significant changes in length for either the focused stretch or control shoulders ($P>.07$). No statistically significant ($P>.08$) differences for all three scapular kinematic variables were found among any of the three groups ($P>.08$)

In our study effect of 4 week on two passive stretch maneuvers on pectoralis minor length and scapular kinematics among collegiate swimmer. The total participants were 30 (15 in Group A and 15 in Group B). The analysis of mean and standard Deviation(S.D) of age for Group A($X=23.4,SD=1.63$), Group B ($X=24.86,SD=2.416$). The analysis of mean and standard Deviation(S.D) of wt for Group A($X=68.6,SD=7.05$), Group B ($X=68.33,SD=4.639$). The analysis of mean and standard Deviation(S.D) of ht for Group A($X=161.66,SD=5.58$), Group B ($X=174.86,SD=5.566$) The analysis of mean and standard Deviation(S.D) of **PECTORALIS MINOR LENGTH cm** IN 0 week for Group A($X=7.56,SD=0.59$), Group B

(X=8.8,SD=1.146)The analysis of mean and standard Deviation(S.D) of **PECTORALIS MINOR LENGTH cm in 4th week** for Group A (X=7.66,SD=0.58), Group B (X=9.65,SD=0.97)The analysis of mean and standard Deviation(S.D) of **ROTATION 90 UPWARDS 0 week** for Group A (X=15,SD=6.26), Group B(X=11.9,SD=5.312)The analysis of mean and standard Deviation(S.D) of **ROTATION 90 UPWARDS4thweek** for Group A (X=16.33,SD=5.97), Group B (X=15.46,SD=4.824

The analysis of mean and standard Deviation(S.D) of **SCAPULAR PROTRACTION 0 week** for Group A(X=8.38,SD=5.51),Group B (X=8.162,SD=0.67) The analysis of mean and standard Deviation(S.D) of **SCAPULAR PROTRACTION 4th week** for Group A(X=8.48,SD=5.48),Group B (X=8.54,SD=0.66) With t-value and p-value of **pectoralis minor length cm** on pre(0 week) is t=0.02476 and (p>0.05) t-value and p-value after 4th week is t=3.275and(p<0.05)With t-value and p-value of **ROTATION 90 UPWARDS** on pre (o week) is t=0.04057 and (p>0.05) t-value and p-value after 4th week is t=1.3096 and(p<0.05)With t-value and p-value of **SCAPULAR PRET** on pre(1st week) is t=0.00276 and (p>0.05) t-value and p-value after 4th week is t=0.0034 and(p<0.05)

Also the graphical representation of data clearly shows that as compared to group A Group B has significant difference in(pre-post session)in all three variable. This shows that Group B has shown significant improvement than that of Group A.

Borstad and Ludewig-et al. Compared three pectoralis minor stretches. Although, all three stretches were reported to increase the length of the pectoralis minor during the stretch period, the “unilateral self-stretch” was found to create the most tissue lengthening. This stretch was performed in a standing position with the target shoulder abducted to 90° and the elbow flexed to 90°. With the hand's volar surface of the target arm placed against a vertical door frame or other flat rigid structure the subject then rotated their trunk away from the target shoulder.

The gross stretch performed in our investigation was similar to Borstad and Ludewig's²⁴ self-stretch as both stretching maneuvers place the humerus in an abducted and externally rotated position while stretching the shoulder further into horizontal abduction and sequentially retracting the scapula. Similar to Borstad and Ludewig's findings, the gross stretch procedure in the current study showed an increase in the length of the pectoralis minor compared to control shoulders. This shoulder position is in accordance with other investigators who suggest that applying a stretch to the pectoralis minor would require movement of the muscle's insertion in a posterior direction in conjunction with scapular retraction that is performed at or above 30° of flexion or

elevation in the scapular plane (scaption), thereby lengthening the muscle. The authors specifically chose to perform the gross stretch with the subjects lying supine as it allowed the investigator to better control the amount of overpressure applied during the stretches. Subjects performing the stretch independently in a standing position may demonstrate varying amounts of applied overpressure to the shoulder during the stretch.

Wang et.al. provided subjects with a home exercise program that incorporated gross strengthening of the shoulder complex as well as a stretching procedure for the pectoralis minor over a six week period. A corner stretching exercise, similar to the gross stretch used in the current research, was performed with the subjects' hands above his or her head on adjoining corner walls. The subjects leaned into the wall in order to feel an anterior chest and shoulder stretch and hold for duration of ten seconds and ten repetitions. The researchers' results revealed significantly less scapular upward rotation and greater internal rotation and inferior translation of the scapula at a horizontal arm position following the exercise program. However, McClure et al³⁸ prescribed a six-week home exercise program to subjects diagnosed with subacromial impingement syndrome using a similar selfstretch and reported no significant kinematic changes.

CONCLUSION

In our study, result reveals that the subject in experimental group B shows significant change in all three variable with p value<0.05

Group A also showed minor change in all three variable of total participant 30

On comparison of group A and group B it was seen that there was no statistically significant difference between the pre intervention scores of Group A and Group B in the study of total 30 patients

On comparison of Group A and Group B it was seen that there was a statistically significant difference in post intervention score between Group A and Group B

LIMITATION

Hand function is as important as shoulder function in swimmer but hand function is not assessed in this study.

Neck extensor is also in a constant isometric contraction along with protectors of shoulder. The study would be more significant if we would have considered neck movement along with shoulder movement.

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“THE NATURAL COURSE OF LOW BACK PAIN AND EARLY INTERVENTION OF HIGH RISK POPULATION”

Author:

Dr. Dhruv Taneja¹

MPT(Musculoskeletal & Sports), Assist professor, Dept of Physiotherapy, Maharaja Vinayak Global University, Jaipur Physiotherapy College, Jaipur Rajasthan, India.

Dr. K.K Singh²

MPT(Ortho), PHD, Principal, Jaipur Physiotherapy College, Maharaja Vinayak Global University, Jaipur Rajasthan, India.

Dr. Ajeet Saharan³

MPT (Neurology), PHD, Associate professor, Dept of Physiotherapy, Maharaja Vinayak Global University, Jaipur Physiotherapy College, Jaipur Rajasthan, India.

Dr. Manoj Kumar Mathur⁴

MPT (Musculoskeletal Disorders). Assist professor, Dept of Physiotherapy, Maharaja Vinayak Global University, Jaipur Physiotherapy College, Jaipur Rajasthan, India.

ABSTRACT

STUDY OBJECTIVES: (1) To apply the afore-mentioned methodological guidelines to the literature on community prevalence of LBP and assign an overall methodological score, (2) To compare studies determined to be methodologically acceptable in an attempt to draw conclusions about the prevalence of LBP in the world population, (3) To estimate of the point prevalence of LBP in North America, and (4) To make suggestions for improving the methodological quality of these types of studies. **DESIGN:** RCT. **SETTING:** Patients were recruited from the orthopedic clinic of a local hospital and several general practitioners' practices. **METHODS:** An RCT was performed with patients randomly assigned to 1 of 2 treatment groups: (1) a group that received general exercise combined with specific trunk muscle stabilization exercise techniques or (2) a group that received general exercise only. The research physical therapist (GAK) who was in charge of the study and who performed the outcome assessments of subjects and data analyses was unaware of group allocation throughout the study. However, the clinical physical therapist (FR) who administered the exercise programs could not be masked to group allocation. Patients were not aware of the theoretical bases of each of the exercise regimens because the study's objective was described to them in the following way: “to identify any differential effect between 2 exercise regimens for the trunk muscles, which have a role in protecting the spine from further injury **OUTCOME MEASURE:** Short-Form McGill Pain Questionnaire (SF-MPQ), visual analog scale (VAS), Roland-Morris Disability Questionnaire (RMDQ). **CONCLUSION:** LBP is a common and usually benign disorder, which is characterized by exacerbations and remissions. However, about 10% of the adult Danish population develops chronic or frequently recurring LBP over several years. Therefore, an effort must be made to identify a high-risk population early in order to implement selective primary preventive measures. LBP is associated with the presence of other disorders in both adults and adolescents, thus, these associations cannot be explained merely by external factors in adult life, but probably have, at least partly, a common origin based on an inherent frailty. We could not predict future LBP by birth factors, although birth weight often is associated with other diseases, but the liability to develop LBP seems to have a genetic component. It is possible that it is the individuals with a strong genetic disposition for LBP, who develop chronic/recurrent LBP in adulthood. If such an underlying genetic predisposition exists, the recurring pattern of LBP is a logical consequence. This predisposition might also indicate a general frailty making individuals more prone to other disorders as well, which would explain the associations between LBP and other disorders.

INTRODUCTION

The term *low back pain* (LBP) is very broad and covers a large heterogeneous group of disorders. These cannot only be characterized by pain, but also by discomfort and/or stiffness. “LBP” probably covers several sub-groups with differing etiologies and prognoses, but since current knowledge does not allow us to determine the exact medical cause of LBP in most patients, ‘nonspecific’ LBP is determined by exclusion. In fact, it has been estimated by some that a somatic cause is found in 10-20% of cases with LBP (1), whereas others find that as much as 97% of LBP is called “non-specific” or “sprain/strain” (2). Thus, LBP refers to a set of symptoms or a syndrome rather than a diagnosis (3). Although low back trouble would be a more precise term, LBP (or nonspecific LBP) is the most commonly used term for non-specific trouble relating to the lower back. As it is also commonly used for indexing purposes, it will be used throughout this thesis.

Although 60-65% of the Nordic population experience LBP during their lifetime (4), only a small subset of these become chronic/recurrent LBP-sufferers (5-7). It has been concluded in American economic analyses that 60-70% of the total costs associated with LBP are related to this subset of individuals (8). According to Petersen et al., musculo-skeletal problems are the most common reason for long-term sick-leave in Denmark (24%) with permanent or recurring back trouble occurring in 10% of the Danish workforce (9). Despite the difference in social security coverage and reimbursement systems, similar figures have been reported from the United States (10). Obviously, there is a lot to gain for society as well as for the individual, if it were possible to identify, at an early stage, those with a high risk of chronicity/recurrence. To gain insight into disease development, it is necessary to understand the natural course of the disease. In a disorder with a highly variable course, such as LBP, this is difficult, and requires long-term follow-up as well as careful considerations of outcome measures. Available data on the natural history of LBP were found to be incomplete and confusing by Von Korff in 1994 (11) and unfortunately this has not improved much since. It still needs to be established what the chances are, that the pain will run a transient, recurrent or chronic course.

In order to prevent long-lasting LBP it is not sufficient to identify risk factors. During the past decades, numerous factors, such as physical characteristics (17), psychological characteristics (18), lifestyle factors (19), employment (20-23), social factors (24,25) and genetic components (26), have been considered risk factors for developing LBP. Despite considerable research efforts, no clear picture has emerged. As proposed by Hartvigsen (27), this might be due to poor design of the studies (cross-sectional, lack of clear definitions of both LBP and the exposure), but it might also be due to more complicated relationships between outcome and exposure. Even though different factors are found to be dominant risk factors in different studies (24,28,29), they may all at the same time be complicating factors or confounders of varying importance. Some factors might enhance each other while some might suppress the effect of others. Furthermore, the same factor may have various influences on different body types, personalities, genetic make-up or subgroups of LBP. It is necessary to recognize the fact that potential risk factors affect people at an individual level, i.e. different people may react differently to a specific stimulus. Etiologic research has so far mainly focused on risk factors. To make prevention efficient, risk factors must be known, but risk groups must also be identified to target the prevention at the most needing group.

To date, only few attempts have been made to describe the group which is most susceptible to LBP and which will respond with morbidity to external stressors. Epidemiological studies have mainly focused on adult populations and several attempts have been made to predict recovery versus nonrecovery of LBP (24,28-30). Since these studies obviously focus on people who already are affected by LBP, this limits the scope to secondary prevention. Ideally, epidemiological studies of the development of LBP should be performed on large, young populations in order to assess the impact of a general inherent frailty on the development of LBP. Obviously, the older a population is, the more difficult it will be to detect the impact of possible inherent risk factors of LBP, as other causative or aggravating factors gradually will confuse the picture.

A group with a high risk of low back pain, might have a high risk of other disorders as well. Due to some underlying disposition, physiological, genetic, social or otherwise, they may be generally susceptible to disease, i.e. they are more 'frail' than the average population. The concept of frailty was introduced in demographic research at the end of the 1970s (31) as a non-observable, hidden susceptibility to death, and is mainly used in relation to aging populations. A full understanding of the concept of frailty may result from a description of how multiple systems intersect to produce frailty (32). The musculoskeletal system is considered to be an essential part of the development of such a frailty, and loss of leg strength has been noted to be the strongest single predictor for subsequent institutionalization, stronger than other physiological markers and disease diagnosis (33). In this way, a cycle of frailty is introduced in old people, where deficits in other systems can impair functions of the musculoskeletal system. Loss of movement capacity, in turn, frequently accelerates declines in other systems, which in turn feed back on the ability to move (34). Bortz even consider the musculoskeletal system to be the entrance pathway for frailty in the elderly (34).

To explore the natural course of LBP, a systematic and critical review of the literature was done, based on articles retrieved from Medline and EMBASE using the comprehensive search strategy recommended by the Back Review Group of the Cochrane Collaboration (44). Articles had to be published from 1992 to 1999 and include at least one-year follow-up of LBP. Furthermore, only original articles with a sample size of 50 or more, written in English or the Scandinavian languages, were included. Methodological quality of the articles was evaluated independently by two reviewers, and the results were analyzed in relation to outcome, nationality, age, gender, and previous history of LBP.

In order to estimate the natural course of LBP in a Danish population, data from the Ebeltoft project, considered to be representative for the Danish middle-aged population, were analyzed for change in LBP status over time. The outcome variable used was number of days with LBP during the past year. On this basis, the cohort was divided into three subgroups: no LBP, short-lasting LBP and long-lasting/recurrent LBP. The transition between these groups over a five-year period was investigated and prevalences, stability within groups, and transition probabilities between groups were reported.

METHODS

As a first step in identifying a frail sub-population with a high risk of LBP, a review of the literature relating to comorbidity with LBP was performed. Medline was searched for articles relating LBP to frailty, comorbidity or a number of individual disorders. A manual search was done through the authors' personal archives relating to LBP, and reference lists were screened. Articles were included if they related LBP to at least one other physical disorder, but excluded if the prevalence of such disorders could not be compared to that of a control group or the general population. The retrieved articles were evaluated for quality and information relating to strength of associations and temporality was extracted.

LBP and birth-factors: The results of the comorbidity study indicated the existence of a generally frail subgroup among teenagers, while others are more robust. The next step was to investigate if a possible susceptibility could be detected already at birth. For this purpose, data about LBP from the Twin Registry were combined with information regarding birth weight, birth length, gestational age and Apgar scores from The Danish Medical Birth Register. Possible associations between LBP in adolescence and birth characteristics were investigated by means of multiple logistic regression analysis and again a twin control study was conducted to control for various confounders.

Heredity of LBP: To investigate whether LBP susceptibility was present even before birth, the relative contribution of genes and environment on the development of LBP in adolescent twins was explored. Information about LBP, gender, age and zygosity was extracted from The Danish Twin Registry. Casewise concordance rates were estimated to test the null hypothesis that genetic factors do not influence the variance of a trait (48). Common odds ratios for MZ- and DZ-twins (comparing the odds for having LBP in twins with affected co-twins to those with unaffected co-twins) were calculated to determine if there was familial aggregation, and MZ and DZ odds ratios were compared in search of an underlying genetic influence (49). Finally, tetrachoric correlation coefficients as well as path analysis were performed to estimate the relative contribution of additive effects of genes, dominant effects of genes, common (shared) family environment and unique (within-family) environment (50). The differences between MZ and DZ tetrachoric correlation coefficients were used to supply evidence of absence/presence of genetic influence on the liability of LBP, and could also indicate the relative distribution of the variance components. In the path analysis, seven different liability models were fitted to data and the Akaike Information Criterion was used to determine the best-fitting model (51). All results were stratified for age to illustrate the variability between age groups.

Design: An RCT was performed with patients randomly assigned to 1 of 2 treatment groups: (1) a group that received general exercise combined with specific trunk muscle stabilization exercise techniques or (2) a group that received general exercise only. The research physical therapist (GAK) who was in charge of the study and who performed the outcome assessments of subjects and data analyses was unaware of group allocation throughout the study. However, the clinical physical therapist (FR) who administered the exercise programs could not be masked to group allocation. Patients were not aware of the theoretical bases of each of the exercise regimens because the study's objective was described to them in the following way: "to identify any differential effect between 2 exercise regimens for the trunk muscles, which have a role in protecting the spine from further injury."

Subjects: Patients were recruited from the orthopedic clinic of a local hospital and several general practitioners' practices. Patients took part in the study after informed consent had been obtained. The rights of human subjects were protected at all times. Patients were eligible for the study if they had a history of recurrent LBP (repeated episodes of pain in past year collectively lasting for less than 6 months) of a nonspecific nature, defined as back pain complaints occurring without identifiable specific anatomical or neurophysiological causative factors. To establish this, all patients included in the trial had a prior clinical examination by their physician, including a radiograph or a magnetic resonance imaging scan. Patients with previous spinal surgery, "red flags" (ie, serious spinal pathology or nerve root pain signs) as outlined in the Clinical Standards Advisory Group (CSAG) report for back pain, or signs and symptoms of instability (radiological diagnosis of spondylolysis or spondylolisthesis corresponding to a symptomatic spinal level; "catching," "locking," "giving way," or "a feeling of instability" in one direction or multiple directions of spinal movements) were excluded. Patients were recruited for the trial at the subacute or chronic stage (onset of their current episode of pain 6 weeks) if their symptoms persisted. The anthropometric and LBP history data of patients who took part in the RCT are presented in Table 1. Patients had to be medically fit (no heart problems, pregnancy, or inflammatory arthritis) and willing to participate in the exercise program and be able to travel independently to the hospital. All subjects were employed at the time of study and were not involved in any current workers' compensation or litigation procedures. The subjects' progress throughout the trial is outlined in the Figure.

	Stabilization-Enhanced General Exercise Group (n=29)		General Exercise-Only Group (n=26)		P
	\bar{X}	SD	\bar{X}	SD	
Anthropometry					
Age (y) ^b	39.2	11.4	35.2	9.7	.16
Height (cm) ^b	170.1	7.5	174.4	9.1	.06
Body mass (kg) ^b	75.9	12.8	80.5	12.0	.18
BMI (kg/m ²) ^b	26.2	4.2	26.4	3.2	.87
History of LBP					
Time since first onset (mo) ^b	57.1	48.1	44.2	51.6	.34
Current duration (wk) ^c	12.0	7.3-22.0	12.0	8.0-12.0	.78

DATA ANALYSIS

Normality of distribution for all data collected was analyzed with the Kolmogorov-Smirnov test. Summary statistics for anthropometric and outcome variables were compared at baseline for the 2 exercise groups (independent-samples t test or Mann-Whitney U test) to establish whether the applied randomization procedure was successful.

A 2 x 3 (exercise group x time) analysis of variance for repeated measures on the second factor was used to analyze each outcome measure separately. The sphericity assumption was checked with the Mauchly test. In addition to examining statistical significance, calculation of mean differences and 95% CIs between each follow-up point and pretreatment data were performed (independent-samples t tests). The level of significance was set at P.05 for all comparisons.

All analyses were performed primarily according to the "intention-to-treat" (ITT) principle, with all subjects randomly assigned for intervention analyzed in their assigned groups.^{53,54} Friedman et al,⁵⁴ however, also suggest that, when withdrawals are inevitable, both a per-protocol analysis and an ITT analysis should be performed; if both types of

analysis concur, the result can be accepted with more confidence. A per-protocol analysis was performed alongside the ITT, using only data from subjects who provided follow-ups on both occasions (n38). Missing data for ITT analyses were handled with a relatively conservative approach by inserting group means in the place of missing values. Statistical analyses were performed using SPSS software, version 9.0.

RESULT

Thirty-six articles fulfilled our inclusion criteria.. Studies are listed in alphabetical order according to the name of the first author.

Quality of data:

The overall quality was generally good, but the following concerns are noteworthy: 1) In 42% (13/31) of the relevant articles, comparison of responders and nonresponders was missing. 2) The exact anatomical demarcation of LBP was not defined in 33% (12/36) of the studies. 3) In 8% (3/36) of the studies, data had not been collected in the preferred manner, i.e. sickleave data from administrative sources and symptom data from interviews or questionnaires. All other criteria were fulfilled, and no studies scored below 67%. It was therefore decided not to exclude any of the studies on basis of the quality assessment.

Number and type of studies:

The 36 included studies were published from 1981 to 1999 (October). Only 4 studies were published in the 1980s [1,2,27,37]. Six studies were RCTs [6,16,17,25,34,35], five were retrospective observational studies [2,19,20,21,46], and the remaining 25 were prospective observational studies. No difference in outcome was noted between these three types of design.

Study populations:

The majority of studies had a population size between 100 and 500 with a range of 62 [32] to 89,190 [20].

Study populations were drawn from several sources: the army [10], schools[4,21,29,32], the general population [28,30], workers receiving compensation [1,2,20,25,27,35,37] and clinical populations [5-9,12,13,16,17,19,22-24,31,33,34,36,39,40,44-46].

Description of LBP:

The gluteal folds were commonly defined as the lower border in the definition of LBP [16,17,22-24,28,31,36,45] whereas the upper border varied from the scapula [45] to the first lumbar vertebra [28]. In several studies the only description provided was "back pain" or "low back pain". Patients with radiating pain were specifically excluded in only one study [17]. In 14 studies [2,5,6,16,20-23,27,34,35,37,39,46] both patients with and without leg pain were included and in the remaining 21 studies there was no mention of radiating pain at all.

Definition of LBP	Length of follow-up	1 week	2 wks	1 mths	2 mths	3 mths	4 mths	6 mths	8 mths	1 year	18 mths	22 mths	2 years	3 years	4 years	≥5 years
Back pain				12,13,40				7				7	12,13			
Low back pain		8		8,33		8		33		4,8,29,33			4,8	4,34	4	4,25,30
Pain bt. scapulae and gluteal folds						45				45						
Pain bt. T12 and gluteal folds			17	17						17						
Pain bt. T12 and gluteal folds or radiating there from			16	16,22,23,24	22,23,24	22,23,24		22,23,24		16,22,23,24						
Pain bt. L1 and gluteal folds								28		28	28					
LBP with/without radiation			6	20,34	20	6,20,34	39	20,35	39	6,20,34,35,39			46			
Back and/or leg/sciatic pain				5		5				5,27,37			37			
Any back related problems																10
Pain bt. 12 th rib and gluteal folds		36				36				31,36						
Generalized pain including the lower back		9				9				9						
Pain below T6								44		44						
Pain or discomfort in the lower part of the spine																21
MS complaints in the lumbar or lumbosacral region										1			1	1		
Pain, ache, stiffness or fatigue in the lower back w/wo radiation			2	2				2								
Back, hip and/or leg pain										19						

For all self-report measures used (pain, disability, and all pain belief scales), the interaction of time with exercise class participation were not significant ($P < .05$), thus indicating that both groups had achieved similar change over time (Tab. 2). The RMDQ data just failed to reach statistical significance when all 3 time points were analyzed together with an analysis of covariance (ANCOVA) ($P < .05$, Tab. 2). When the 2 follow-up time points were analyzed separately and for the RMDQ only, there was a statistically significant between-group difference immediately following exercise (mean difference 2.55, $P < .027$) in favor of the general exercise-only group, but this difference was no longer present at the 3-month follow-up. Both groups improved immediately following intervention ($P < .001$), and these improvements were maintained 3 months later for all outcome measures apart from the PLC pain control subscale, which remained unchanged (Tab. 3). For all outcome measures, results were the same with both types of analyses (ITT and per protocol). Only the results of the ITT analyses, therefore, are presented (Tabs. 2 and 3). The VAS B data were adjusted for the differences in baseline using an ANCOVA.

DISCUSSION

One of the strengths of our study is the age of the cohorts. Participants in the Ebeltoft study belong to the age group, where chronicity could be expected to be initiated, and is therefore an ideal age to study the natural course. Our participants from The Danish Twin Register are young and therefore relatively unaffected by the influences of adult life. The young twin cohort is also large enough to study comorbidity. Further, it requires large data bases to do the age-stratified biometric modeling, and The Danish Twin Register is one of the few twin data bases world-wide where this is possible (39).

The use of questionnaires designed to investigate several aspects of life in the general population (this was the case for both The Ebeltoft Project and The Twin Register) has the advantage, that the population is not self-selected in terms of LBP. Previous work has shown that respondents to LBP surveys tend to differ from non-responders in their experience of LBP (56,57). However, participants in health surveys generally may be self-selected by their interest in health-related questions and characterized by a lower threshold for the recognition of health problems, including LBP (7). This might have been the case in the Ebeltoft study, where women were somewhat over-represented in the study population compared to the target population and the prevalence of LBP was higher among women than among men. Fortunately, such a possible over-reporting is unlikely to affect the analysis of transition patterns between LBP-groups, but should be considered, when interpreting prevalence data. In the twin study, the bias resulting from such a self-selection process is probably negligible due to the high response rate.

In the literature many types of morbidity are linked to low birth weight (54), however this was not the case for LBP in our population. No previous studies about the relationship between LBP and birth weight or other birth factors were found. Since we did not find any associations with other birth factors either, a possible predisposition for LBP cannot be detected at birth in our data.

There seems to be a significant genetic component in the liability to develop LBP, which is most pronounced in the younger years, and with a non-additive genetic component in the adult population. Such a genetic component has previously been demonstrated for degenerative disc disease (67-69), for sciatica (70), for LBP of functional importance for work (26), and for self-reported non-specific LBP in the older cohort of The Danish Twin Register (71). The increasing influence of non-shared environment with age was also indicated in other studies (52), but to our knowledge, biometric modeling of the liability to LBP has not been attempted previously and thus the existence of nonadditive components in the liability to LBP has so far been undetected. Path analysis has been done for the liability of degenerative disc disease. An AE model, including additive genetic effects and individual environment, while ignoring dominant genetic effects and shared environment, was found to have the best fit. However, the analyses were not stratified for age, so a possible dominant effect in certain age groups might have been overlooked.

According to some authors, all patients with LBP may benefit from spinal stabilization exercise retraining on the premise that deconditioning of trunk muscles leads to instability symptoms, 16-19 without any definitive proof from a relevant RCT yet. To test for this, we recruited subjects with nonspecific LBP. However, our findings tend to suggest that general trunk muscle exercises alone, without the addition of stabilization exercises, reduce patient self-reported disability more effectively immediately after the end of a 2-month exercise period. A statistically significant difference was observed between the 2 groups for the reduction in RMDQ scores (mean difference 2.55, $P < .027$) in favor of the general exercise-only group for the RMDQ data acquired immediately post-treatment. Both groups made a clinically significant improvement based on a 4-point within-group change (56); however, the improvement in the stabilization-enhanced exercise group was suboptimal compared with the general exercise-only group for the immediate post-exercise comparison. According to previous research, a 2.5-point between-group difference in RMDQ scores can be considered as minimally important (51); therefore, the null hypothesis for our study can be rejected based on this result. However, for all of the remaining outcome measures, no between-group differences could be detected either immediately post-exercise or 3 months later. The difference in the RMDQ scores also was no longer present at the 3-month follow-up.

Scores by Group Over Time and P Values for the Interaction Effect^a

	Pretreatment ^b						8 Weeks						20 Weeks						P
	Stabilization-Enhanced General Exercise Group (n=29)			General Exercise-Only Group (n=26)			Stabilization-Enhanced General Exercise Group (n=29)			General Exercise-Only Group (n=26)			Stabilization-Enhanced General Exercise Group (n=29)			General Exercise-Only Group (n=26)			
	\bar{X}	SD		\bar{X}	SD		\bar{X}	SD		\bar{X}	SD		\bar{X}	SD		\bar{X}	SD		
Pain scale																			
SF-MPQ, sensory descriptors	12.2	4.0		12.9	5.2		7.9	4.1		7.7	5.2		6.4	4.8		8.3	5.2		.29 ^c
SF-MPQ, affective descriptors	3.5	2.9		3.5	2.8		1.7	1.6		1.1	1.3		1.3	1.9		1.9	2.0		.18 ^c
SF-MPQ, total score	15.7	5.4		16.3	6.4		9.6	5.2		8.8	5.9		7.7	6.4		10.2	6.3		.15 ^c
VAS B (pain in past week)	26.9	20.6		40.2	24.6		12.3	13.7		21.3	17.3		15.8	15.3		17.8	14.2		.30 ^d
VAS C (pain in past month)	49.9	26.4		55.9	25.5		22.3	18.3		27.8	15.6		23.1	18.8		28.8	16.9		.98 ^c
Disability																			
RMDQ	9.2	4.6		11.3	5.2		5.1	4.0		4.7	3.5		4.5	3.8		5.2	3.5		.05 ^c
Pain beliefs																			
Fear of movement (TSK)	37.6	6.3		40.5	8.9		33.7	6.5		35.1	7.1		31.5	6.1		32.9	5.3		.57 ^c
PSEQ	42.0	12.3		37.3	11.1		49.2	8.6		48.1	7.7		51.2	8.3		48.9	9.4		.38 ^c
PLC, pain control	12.4	4.5		11.2	6.0		12.4	4.3		11.3	5.0		10.9	3.6		9.9	4.1		.99 ^c
PLC, pain responsibility	8.4	1.9		8.0	2.4		9.4	1.9		9.3	2.2		9.7	1.9		10.2	1.9		.23 ^c

^a SF-MPQ=Short-Form McGill Pain Questionnaire, VAS=visual analog scale, RMDQ=Roland-Morris Disability Questionnaire, TSK=Tampa Scale of Kinesiophobia, PSEQ=Pain Self-Efficacy Questionnaire, PLC=Pain Locus of Control Scale.

^b Independent-samples *t* test showed no differences at baseline between the 2 groups for all outcome measures ($P>.05$) apart from VAS B ($P=.034$).

^c 2×3 (exercise group \times time) analysis of variance.

^d Adjusted for baseline, 2×3 analysis of covariance.

	Stabilization-Enhanced General Exercise Group (n=29)		General Exercise- Only Group (n=26)		Between-Group Mean Difference	95% CI
	\bar{X}	SD	\bar{X}	SD		
Pain scale						
MPQ, sensory descriptors ^b						
8 wk-pretreatment	-4.25	4.63	-5.21	5.48	0.95 ^c	-1.78 to 3.68
20 wk-pretreatment	-5.79	5.05	-4.63	6.00	-1.16 ^c	-4.15 to 1.82
MPQ, affective descriptors ^b						
8 wk-pretreatment	-1.81	2.87	-2.32	2.34	0.51 ^c	-0.91 to 1.94
20 wk-pretreatment	-2.23	3.30	-1.52	2.65	-0.71 ^c	-2.34 to 0.92
MPQ, total score ^b						
8 wk-pretreatment	-6.06	6.44	-7.49	6.43	1.42 ^c	-2.06 to 4.91
20 wk-pretreatment	-8.02	7.39	-6.11	7.30	-1.91 ^c	-5.89 to 2.07
VAS B (pain in past week) ^{b,d}						
8 wk-pretreatment	-18.18	18.80	-14.92	16.52	-3.26 ^c	-10.15 to 3.63
20 wk-pretreatment	-15.16	19.10	-17.78	19.70	2.62 ^c	-4.58 to 9.82
VAS C (pain in past month) ^b						
8 wk-pretreatment	-27.57	29.96	-28.16	26.64	0.58 ^c	-14.82 to 15.99
20 wk-pretreatment	-26.82	27.23	-27.10	27.14	0.28 ^c	-14.45 to 15.00
Disability						
RMDQ ^b						
8 wk-pretreatment	-4.05	3.26	-6.60	4.97	2.55 ^e	0.30 to 4.81
20 wk-pretreatment	-4.65	3.26	-6.03	4.98	1.38 ^c	-0.87 to 3.64
Pain beliefs						
Fear of movement (TSK) ^b						
8 wk-pretreatment	-3.95	5.11	-5.40	6.51	1.46 ^c	-1.69 to 4.61
20 wk-pretreatment	-6.13	6.57	-7.62	7.09	1.49 ^c	-2.21 to 5.18
PSEQ ^b						
8 wk-pretreatment	7.17	11.41	10.75	11.22	-3.58 ^c	-9.71 to 2.55
20 wk-pretreatment	9.19	11.06	11.53	10.97	-2.34 ^c	-8.31 to 3.62
PLC, pain control ^f						
8 wk-pretreatment	0.04	5.05	0.09	5.96	-0.05 ^c	-3.05 to 2.96
20 wk-pretreatment	-1.43	5.24	-1.26	5.76	-0.17 ^c	-3.17 to 2.84
PLC, pain responsibility ^b						
8 wk-pretreatment	0.97	2.06	1.33	2.09	-0.36 ^c	-1.50 to 0.77
20 wk-pretreatment	1.26	2.26	2.24	2.13	-0.97 ^c	-2.18 to 0.23

The greater improvement in the general exercise– only group may signify that perhaps specific muscle stabilization retraining is more relevant to patients with either gross spinal instability symptoms 12 or pronounced side-to-side differences in the size of the multifidus muscle 11 than to our subjects, who did not present any signs and symptoms of clinical instability as described in the literature. 32,57 The patients in the study by O’Sullivan et al12 had radiological confirmation of an unstable segment related to the pain distribution, and also the patients in the study by Hides et al11 showed a good correlation between the level of side-to-side multifidus muscle CSA imbalance and the level of their pain.

The mode of action of stabilization retraining still remains unclear, because it has not been shown to be capable of mechanically containing an unstable segment, even upon improvement of muscle activation. No direct long-term effect of stabilization exercises on the status of the local stabilizing muscles has been demonstrated. Hides et al21 demonstrated less LBP symptom recurrence 3 years after treatment but did not verify the role of CSA, which was measured only in the initial study11 and not the follow-up.21 Similarly, no long-term improvement in the activation of the local stabilizing muscles has been presented. Thus, these studies suggest only a possible role for “stabilization” and illustrate the need for more comprehensive long-term assessments.

From a methodological point of view, the frequency and duration of the studied interventions (2–5 times per week for 8 weeks) were deemed appropriate to produce demonstrable benefits, based on previous studies of similar or less exercise duration.9,48,59,60 Because increasing doses of low back active exercises have been associated with an increase in reported benefits,61 we attempted to avoid confounding our results due to this factor by balancing the exercise dosage between the groups, based on prior literature on the loading imposed on the trunk muscles with each type of exercise. Exercises were administered in a progressive manner for both groups, and classes were supplemented with exercise leaflets to maintain motivation. The relatively high level of adherence both during classes and at home confirms patient motivation to complete the exercise program. The treating physical therapist had extensive expertise in stabilization exercise intervention delivery through attendance of specialized seminars on the topic and its subsequent application. However, correct contraction of the stabilizing muscles could not be achieved in all subjects in the stabilization–enhanced exercise group until 2 to 3 sessions had passed, and subjects had to be constantly corrected by the treating physical therapist each time new exercises were introduced, similar to the study by O’Sullivan et al.12 However, the

subjects in the general exercise– only group could perform the exercises correctly by following the leaflets provided, with minimal instruction required from the physical therapist.

A limitation to our study was that, apart from the clinical physical therapist palpating the transverses abdominis and multifidus muscle contraction in the subjects in the stabilization–enhanced exercise group, there was no other means of verifying whether these muscles were recruited appropriately. However, due to our intention to monitor the effect of stabilization exercises delivered under pragmatic, clinical conditions used in everyday practice, the use of sophisticated devices such as electromyographic biofeedback units or real-time ultrasound scanners, as advised by some authors,^{11,62} was avoided. Positive effects of stabilization exercises also have been reported by O’Sullivan et al,¹² who used less sophisticated feedback techniques such as the facilitation techniques used in our study.

Two subjects dropped out from the stabilization– enhanced exercise group due to complaints of pain. Their increase in pain, however, could not be attributed with certainty to the exercises, because pain did not begin during exercise performance time. The percentage of subjects from this group who developed pain(6.9%) was not alarmingly high enough to suspect that the increase in pain was due to the exercises administered, nor has such an incident been reported in any similar previous study.

An important finding of our study was that, although exercise was prescribed under a biomechanical framework (to train the muscles surrounding the spine in order to protect it) and we did not adopt strict psychological principles of exercise delivery, within-group improvement in 3 of the 4 psychological outcome measures was documented for both groups. Namely, participants’ ideas about fear of movement/injury or reinjury, self-confidence in the performance of activities despite the pain, and the PLC pain responsibility subscale (patients’ degree of responsibility in controlling their pain levels) registered improvements on both posttreatment follow-ups. However, no appreciable change was noted in one other outcome measure (PLC pain control subscale). Similar multidimensional changes have been reported by several researchers who adopted primarily a “physiological type” of approach to intervention⁶³ as well as those who used psychological approaches in conjunction with exercise.

The information provided in The Back Book may have resulted in a positive shift in patient beliefs regarding LBP, as previously demonstrated.³⁷ In our opinion, however, the shift in beliefs also was reinforced by patient problem-solving interactions with the treating physical therapist on how to perform the exercises and by the fact that some pain during exercise was to be considered normal may have led to increased patient adherence, allowing the subjects to participate in a number of exercise routines. Patients’ exposure to potentially back-straining movements, such as spinal flexion, has been shown to decrease the avoidance of such activities and perhaps patient levels of disability in general. Exercises were delivered in a progressive method, from easier to more difficult for both programs, to progressively introduce patients to more demanding exercises, according to graded exposure principles. Due to the design of our study, it was not clear whether all of these factors resulted in the improvement of patient beliefs regarding LBP.

Several studies have shown that patients who are less fearful and more optimistic about their abilities to function despite LBP report less pain behavior and disability and demonstrate fewer functional limitations compared with patients who have increased fear and decreased pain self-efficacy beliefs. The reduction noted in some of the psychological factors measured also may have been related to decreased pain and disability report. However, due to the nature of our trial and the very few time points when the data were collected, a clear order of the change in the variables measured (pain, disability, and patient beliefs) could not be established. This can be a future avenue for exploration.

CONCLUSION

LBP is a common and usually benign disorder, which is characterized by exacerbations and remissions. However, about 10% of the adult Danish population develops chronic or frequently recurring LBP over several years. Therefore, an effort must be made to identify a high-risk population early in order to implement selective primary preventive measures.

LBP is associated with the presence of other disorders in both adults and adolescents, thus, these associations cannot be explained merely by external factors in adult life, but probably have, at least partly, a common origin based on an inherent frailty. We could not predict future LBP by birth factors, although birth weight often is associated with other diseases, but the liability to develop LBP seems to have a genetic component. It is possible that it is the individuals with a strong genetic disposition for LBP, who develop chronic/recurrent LBP in adulthood. If such an underlying genetic predisposition exists, the recurring pattern of LBP is a logical consequence. This predisposition might also indicate a general frailty making individuals more prone to other disorders as well, which would explain the associations between LBP and other disorders.

Follow-up studies of young populations are needed to confirm the existence of a high-risk group.

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COMPARISON BETWEEN THE EFFECT OF THERAPEUTIC MASSAGE AND SELF-CARE BOOK FOR PATIENTS WITH CHRONIC NECK PAIN.

Dr. K.K Singh¹

MPT (Ortho), PHD, Principal, Jaipur Physiotherapy College, Maharaja Vinayak Global University, Jaipur, Rajasthan, India.

Dr. Ajeet Saharan²

MPT (Neurology), PHD, Associate professor, Dept of Physiotherapy, Maharaja Vinayak Global University, Jaipur Physiotherapy College, Jaipur Rajasthan, India.

Dr. Dhruv Taneja³

MPT (Musculoskeletal & Sports), Assist professor, Dept of Physiotherapy, Maharaja Vinayak Global University, Jaipur Physiotherapy College, Jaipur Rajasthan, India.

Dr. Manoj Kumar Mathur⁴

MPT (Musculoskeletal Disorders). Assist professor, Dept of Physiotherapy, Maharaja Vinayak Global University, Jaipur Physiotherapy College, Jaipur Rajasthan, India.

ABSTRACT

Objectives—To know the effectiveness of therapeutic massage, one of the most used complementary physiotherapy treatments for neck pain. This research was conducted to evaluate whether therapeutic massage is more beneficial than a self-care book for patients with chronic neck pain.

Methods—Sixty-four such patients were randomized to receive up to 10 massages over 10 weeks or a self-care book. Follow-up telephone interviews after 4, 10, and 26 weeks assessed outcomes including dysfunction and symptoms. Log-binomial regression was used to assess whether there were differences in the percentages of participants with clinically meaningful improvements in dysfunction and symptoms (i.e., > 5 point improvement on the Neck Disability Index (NDI); > 30% improvement from baseline on the symptom bothersomeness scale) at each time point.

Results—At 10 weeks, more participants randomized to massage experienced clinically significant improvement on the NDI (39% vs. 14% of book group; RR= 2.7; 95% confidence interval (CI) = 0.99–7.5) and on the symptom bothersomeness scale (55% vs. 25% of book group; RR=2.2; 95% CI=1.04–4.2). After 26 weeks, massage group members tended to be more likely to report improved function (RR=1.8; 95% CI=0.97–3.5), but not symptom bothersomeness (RR=1.1; 95% CI=0.6–2.0). Mean differences between groups were strongest at 4 weeks and not evident by 26 weeks. No serious adverse experiences were reported.

Conclusions—This study suggests that massage is safe and may have clinical benefits for treating chronic neck pain at least in the short term. A larger trial is warranted to confirm these results.

INTRODUCTION

Neck pain is a common health problem in the United States and other developed countries. It has been estimated that about 70% of adults are afflicted by neck pain at some time in their lives,^{1,2} 10 to 40% of adults are bothered by neck pain each year,³ 10 to 15% of adults report neck pain that has persisted more than 6 months in the past year,² and 5% of adults are currently experiencing disabling neck pain.¹ Although a multiplicity of options are available for treating neck pain, little solid evidence exists to guide clinicians and patients regarding the most effective treatments. Standard medical practice employs rest, medication, physical medicine modalities, and education.^{4,5} Medications, especially non-steroidal anti-inflammatories, and referral for physiotherapy were the most common treatments used by general practitioners in a recent study of how primary care physicians diagnose and treat patients with chronic neck pain.⁶ Neck pain is the second most common condition for which complementary and alternative medical (CAM) therapies are used.⁷ In the US, chiropractic and massage are the most commonly used CAM therapies for neck pain.⁷ Almost 1 in 4 chiropractic visits and 1 in 5 massage visits are for neck symptoms.^{8–10} Although therapeutic massage is one of the most popular treatments for neck pain, few studies have evaluated its effectiveness for this condition. We therefore conducted this exploratory pragmatic clinical trial in a primary care population to evaluate the value of therapeutic massage as a treatment for chronic neck pain.

MATERIALS AND METHODS

Study Design and Setting:

This randomized, parallel-group trial compared the effectiveness and safety of therapeutic neck massage with a self-care book for patients whose neck pain had persisted at least 12 weeks. The study was conducted in Jaipur. All study participants gave informed oral consent before eligibility screening and informed written consent before the baseline interview and randomization.

Participants:

Between March and July, 2004, we enrolled between 20 and 64 years of age who had received primary care for neck pain at least three months prior were mailed a letter describing the study. Patients who returned statements of interest were telephoned by a researcher who assessed their eligibility for the study. After eligible and interested patients signed consent forms, interviewers telephoned them again to collect baseline data and randomize them to treatment group.

Potential participants were excluded if they 1) had neck pain likely due to a non-mechanical cause (e.g., metastatic cancer, fractured vertebrae, spinal stenosis); 2) had complex neck pain or neck pain potentially inappropriate for massage (cervical radiculopathy, prior neck surgery, litigation for neck pain, motor vehicle accident within past three months); 3) had unstable serious medical or psychiatric conditions or dementia; 4) had minimal neck pain (rating of less than 3 on 0 to 10 point bothersomeness scale) or had had neck pain lasting less than 12 weeks; 5) were currently receiving other treatments for neck pain apart from medications; 6) had used massage for neck pain within the last year; or 7) could not speak or understand English.

Randomization:

Using a computer program with variable block sizes of four or six, treatment assignments were randomly generated and placed in opaque, sequentially numbered envelopes by a researcher not involved in patient recruitment or randomization. The envelopes were stored in a locked filing cabinet until needed for randomization.

Treatments:

Participants in the trial retained access to the medical care available as part of their insurance benefits. Those randomized to massage received up to 10 massage treatments over a 10-week period, with the exact number of visits based on each participant's clinical progress as determined by the massage therapist, based on their findings and the comments of the participant.

. Participants were assigned a massage therapist according to geographic location and schedule availability. The massage protocol permitted a variety of commonly used Swedish and clinical massage techniques and allowed massage therapists to make typical self-care recommendations, such as to exercise or to drink more water and is described in detail elsewhere.

Participants randomized to the self-care group were mailed a copy of *What to Do for a Pain in the Neck*. This book includes information on potential causes of neck pain, neck-related headaches, whiplash, recommended strengthening exercises, body mechanics and posture, conventional treatment, complementary therapies for neck pain, and first aid for intermittent flare-ups. No additional instruction about using the book was provided.

Outcome Measures

At baseline and 4, 10 and 26 weeks after randomization, participants were interviewed by telephone interviewers unaware of treatment group. Participants received \$5 for completing the 10 week interview and \$10 for completing the 26 week interview. In addition to assessing the primary and secondary outcomes, the baseline telephone interview asked about sociodemographic characteristics, neck pain history and the current episode, health status and knowledge of and expectations about the helpfulness of massage and self-care education. Our primary outcomes were neck related disability and symptom bothersomeness. The Neck Disability Index (NDI), a 10-item (0 to 50 point or 0 to 100 percentage point) questionnaire that has high internal consistency and test-retest reliability,¹³ was used to measure neck-related disability. An eleven point (0 to 10) numerical rating scale was used to assess how bothersome participants felt their neck pain had been in the previous week. A similar measure showed good construct validity in earlier research for back pain.¹⁴ These outcomes were evaluated as both continuous and dichotomous variables. For the dichotomous variables, improvement was defined as a decrease of five or more points on the NDI or a decrease of 30 percent or more on the bothersomeness scale. The cut points for the NDI values have been previously shown to be most strongly associated with patients' global rating of their improvement (i.e., "better or much better" compared with no improvement).¹⁵ Secondary outcomes included a newer measure of neck pain disability, the Copenhagen Neck Functional Disability Scale,¹⁶ general health status as assessed by the Short Form-36,¹⁷ degree of restricted activity as indicated by patient responses to two questions,¹⁸ use of medications in the last week, and a one-question rating of global improvement. We assessed global improvement by asking participants: "Compared to the neck pain you felt before you began this study, is your neck pain now..." completely gone, much better, better, a little better, about the same, a little worse, or much worse. We also collected self-reported information on all treatments used for neck pain during the study period. After all other outcome data were collected at the 10-week interview, we asked participants receiving massage about adverse experiences. Specifically, we asked participants: "Do you believe there was anything about your massage treatments that caused you to feel significant discomfort, pain or harm" and if they replied yes, to explain what happened.

Statistical Analysis

The study was designed to have 80% power to detect an effect size of 0.75 with a two-sided α of 0.05. Intention to treat analyses were used. Baseline characteristics were compared between groups with the use of chi-square tests for binary variables, *t*-tests for comparing means of continuous variables, and the Mann Whitney U test for comparing distributions of ordinal variables. Continuous outcome variables were analyzed using linear regression, and dichotomous outcome variables were analyzed using log-binomial

regression. We fit regression models using generalized estimating equations¹⁹ with an exchangeable correlation structure to adjust for possible correlation within patients over the three follow-up time points. We included separate treatment effects for each follow-up time point, and adjusted for the baseline value of the outcome. All P values are two sided with an α of 0.05 used to determine statistical significance.

Results

Baseline Characteristics:

The typical study participant was female, between 40 and 50 years of age, married, employed, and had attended college. The average time since first neck pain was 7.6 years and 81% had had their current episode for at least a year. Few participants reported recent work loss or restricted activity, but more than half had used medications in the previous week, primarily non-steroidal anti-inflammatory medicines. Participants had higher expectations of helpfulness for massage than for self-care.

Study Treatments:

All participants in the massage group made at least one visit for massage (median of 8, range = 1 to 10, with 79% making 7 or more visits). Visits lasted a median of 75 minutes at the first visit and 60 minutes thereafter. In response to a question about the need for further treatments, massage therapists indicated that 87% of participants were ready to be discharged at the end of the last visit they made. All practitioners used more than one massage technique at each visit (a median of 7 techniques, with a range of 4 to 15 per visit). The most common techniques used were: kneading (frequently used by all 9 massage therapists); friction (frequently used by 8 therapists) and clinical gliding (frequently used by 7 therapists). Swedish gliding, traction, and trigger point therapy were frequently used by 6 of the therapists. All of the massage therapists reported massaging muscles in the neck, 8 reported massage of the upper back (especially the trapezius muscle), 5 reported massage of other parts of the back, 4 reported massage to the pectoral muscles and another 3 reported massaging the rotator cuff or the arms. Massage to other areas of the body, such as the legs, feet or hands, was less commonly reported. All the therapists made self-care suggestions to virtually all (94%) of their patients. The most common suggestions were stretching (made by 9 therapists), body awareness (made by 8 therapists) and increasing water intake (made by 7 therapists). Only one massage therapist, who often incorporated acupressure into her treatments, reported being constrained by our protocol, which proscribed acupressure. All but one participant in the self care group reported reading at least some of the book, with 85% reporting having read at least one-third of it.

Nonstudy Treatments:

During the 10-week intervention, 13% of participants in the massage group versus 21% in the book group reported making visits to non-study healthcare providers for neck pain ($p=0.49$). Chiropractors ($n=4$) were the most common healthcare provider seen. Only one participant in the control group received massage. Over the six-month study period, 37% of the massage group and 25% of the self-care group visited a healthcare provider ($p=0.40$). Primary care providers ($n=7$), chiropractors ($n=7$) and massage therapists ($n=10$) were the most common type of provider visited. Seven participants in the massage group made a visit to a massage therapist after their treatment period had ended compared with three in the control group.

Functional Status and Symptoms

Mean scores on the Neck Disability Index declined more in the massage group than in the self care group during the first 4 weeks of treatment. This initial benefit of massage persisted throughout the 26-week follow-up, although these differences were statistically

significant only at 4 weeks. We also found that a greater proportion of the massage group than the self-care group reported a clinically meaningful improvement in the Neck Disability Index (*i.e.*, at least 5 points) at 4, 10 and 26 weeks. The difference between groups was most pronounced during the 10 weeks of the treatment period. The mean scores for symptom bothersomeness also declined more quickly in the massage group than in the self-care group, but these differences were no longer statistically significant by 10 weeks and virtually disappeared by 26 weeks. Similarly, a significantly higher proportion of the massage group reported a clinically meaningful change in the symptom bothersomeness score during the 10-week treatment period, but those differences were attenuated by 26 weeks.

Secondary Outcomes:

The Copenhagen Neck Functional Disability Scale was relatively insensitive to change and showed only modest differences between groups at 4 and 10 weeks (4 weeks: mean score difference (95% confidence interval (CI)) = -1.6 (-3.4 to 0.24); $p=0.089$; 10 weeks: mean score difference (95% CI) = -0.7 (-2.8 to 0.15); $p=0.55$). The SF-36 physical and mental health component scores did not differ significantly between groups. Few individuals reported neck -related work loss or restricted activity during the study. Participants in the massage group were more likely to report they were “better” or “much better” on the patient global rating of improvement at all follow-up times, with the greatest between group difference at 4 weeks. Medication usage, which was similar at baseline, did not change in the massage group but increased by 14 percentage points in the book group at 26 weeks.

Adverse Experiences:

No moderate or severe adverse experiences were reported. Nine patients reported mild adverse experiences, which did not result in disruption of daily activities, that were likely attributable to massage: Five participants reported discomfort or pain during one or more of their massage treatments, three participants reported increased soreness after treatment and one participant, who suffered from migraines, reported nausea for a day after each treatment. One of these participants discontinued treatments because of pain after the first treatment.

Discussion:

This study suggests that therapeutic massage has clinically important benefits at least in the short term for persons with chronic neck pain. Our findings are unlikely to be due to other treatments for neck pain, as other treatments were used infrequently in both groups. Nor can the results be attributed to greater medication use in the massage group, because this did not occur. Furthermore, these findings are unlikely due to baseline differences between the groups as the groups were quite similar across a broad range of measures. In this study, the Neck Disability Index was more sensitive to change than the Copenhagen Scale, a finding that has been reported previously.²⁰ Recently, Ezzo²¹ published a systematic review of 19 trials of massage for mechanical neck disorders. However, 13 of these included massage as part of a multimodal physiotherapy intervention and were unable to tease apart the relative contribution of massage. Moreover, these trials did not describe how much massage was actually administered. Of the 6 “massage only” trials reviewed, 2 involved only one treatment session and 1 each studied self administered massage, persons with headache of “cervicogenic origin,” Chinese massage, and Swedish massage. In this last trial, Irnich²² found that compared to acupuncture or laser treatment, massage was less likely to result in improvements in motion-related pain. Dysfunction due to neck pain was not measured. The “dose” of massage used in that study (five 30-minute treatments) was substantially less than in the present study. Furthermore, the

massage given in the Irnich study does not resemble conventional massage practice in the US, where therapy sessions would be twice as long, provided by a licensed massage therapist, and include a wider range of massage techniques as well as self-care recommendations.¹⁰ Thus, none of these previous studies of massage shed light on the usefulness of the type and dose of massage used in this study or included the type of massage received by the general public seeking therapeutic massage for neck pain. Our findings raise the question of the most clinically useful way to present a study's results. Typically, studies of treatments for spine pain display results as mean differences between groups (or from baseline). However, such data do not always highlight important clinical differences between groups.²³ For example, our dichotomized results for the primary outcomes measures showed stronger benefit for massage than the mean change between groups. Clinicians often characterize patients as having benefited or not from the treatments. Displaying study outcomes as the proportion receiving each treatment who have benefited to a clinically meaningful extent will make the study results easier for clinicians to interpret. One downside of this approach is that if the main study outcomes are dichotomized as improved (to an important extent) or not, the required sample sizes to detect a 10 – 20% difference in the proportion who have improved would usually be larger than that required to detect a mean change equal to the minimum clinically important difference. Our trial evaluating massage for neck pain was not designed to tease apart the specific effects of soft-tissue manipulation from those attributable to the patient-provider interaction, the home practice recommendations, or expectations of the patient. Thus, our trial cannot shed light on which aspects of the massage experience might have been responsible for the benefits seen. Rather we conducted a more pragmatic trial to evaluate massage for neck pain. There were clearly differences between the two groups regarding patient provider interactions as everyone in the massage group, but only about 1 in 5 persons in the self-care group visited at least one type of health care provider during the intervention period. However, this design is most appropriate for answering clinical questions regarding the benefits of massage therapy for patients with chronic neck pain seen by primary care providers. Reassuringly, the mean scores on the Neck Disability Index were comparable to those of primary care neck pain patients in other therapeutic trials.^{15,24,25} Nevertheless, our study includes some important methodological strengths, notably a treatment protocol that reflected common practice, a rigorous randomization procedure, good adherence to treatment recommendations, high follow-up rates, and the use of recommended outcome measures administered by interviewers unaware of treatment group. Limitations of this study include modest size, the impossibility of masking people to study treatment (as is generally true of studies of physical treatments), follow-up of less than one year, and the absence of participants with severe neck pain. Despite these limitations, our data suggest that therapeutic massage is helpful in relieving neck pain and dysfunction for a substantial fraction of individuals, at least in the short term. Because some of the exclusion criteria for this study (e.g. exclusion of participants with cervical radiculopathy, prior neck surgery, litigation for neck pain, motor vehicle accident within the past three months, and currently receiving treatments for neck pain apart from medications) may well have eliminated some people who would seek massage therapy for their neck pain in the community, future studies would be required to evaluate the effectiveness of massage in such individuals. Future studies should investigate the optimal dose of massage including the number of treatments, the frequency of treatments and the length of the treatment period as well as the usefulness of “booster” sessions or self-massaging devices, in extending the time frame for these benefits. Once the treatment is optimized, larger studies should be conducted that include at least one year or longer follow-up period and patients with more severe neck pain. Such studies should include multiple outcome measures, including global rating of improvement, which we found to show an important difference between treatment groups at all follow-up interviews.

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A COMPARATIVE STUDY BETWEEN MANUAL THERAPY AND CONVENTIONAL THERAPY IN CASE OF PLANTAR FASCIITIS

Mukesh Kumar Goyal

Tantia University, Sri Ganganagar (Rajasthan) 335001 India

ABSTRACT

Objective: To compare the effectiveness of manual therapy with conventional therapy on pain and disability in patients with plantar fasciitis.

Background: There is limited evidence available which support that manual therapy can be used as an intervention in the management of plantar fasciitis.

Study Design: Experimental study and different subject design.

Methods: Patients diagnosed with plantar fasciitis underwent a standard evaluation and completed a self-report questionnaire including the Foot Function Index (FFI), and the Numeric Pain Rating Scale (NPRS). 30 patients were randomly divided in two groups, to be treated with either Conventional therapy or Manual therapy approach. Outcomes of treatment were captured on the 1st day and 21st day of the treatment session.

Results: The data was analysed using unpaired 't' tests. NPRS was mean 6.53 versus 6.80 for pre-treatment in group A and group B respectively; $t=0.50$, $p=0.62$ and mean 2.27 versus 1.00 for post-treatment in group A and group B respectively; $t=2.62$, $p=0.01$ FFI was mean 41.01 versus 42.67 for pre-treatment in group A and group B respectively; $t=0.77$, $p=0.49$ and, mean 6.20 versus 4.16

INTRODUCTION

Plantar fasciitis is a non-inflammatory degenerative syndrome of the plantar fascia resulting from repeated trauma at its origin on the calcaneus.¹ To date, there is evidence that this condition may not be characterized by inflammation but, rather by non-inflammatory degenerative changes in the plantar fascia.²

Plantar fasciitis is the most common cause of heel pain^{3,4}. It has been estimated that it affects as much as 10% of the general population over the course of a lifetime.⁵ The condition is bilateral in up to one-third of cases. Incidence reportedly peaks in people between the age of 40 to 60 years in general population.⁶ The condition is thought to be multi-factorial in origin with factors such as obesity, decreased ankle joint range of motion, prolonged weight bearing and increase in age are suggested to be commonly involved^{7,8}. Buchbinder et al⁶ in his study observed that risk of plantar fasciitis increases as the range of ankle dorsiflexion decreases. Individuals with less than 10° of ankle dorsiflexion had an odds ratio of at least 2:1 for plantar fasciitis and the ratio increased dramatically as the range of dorsiflexion decreased.⁵ Patients typically report an insidious onset of pain which is usually burning, stabbing, dull-aching or sharp in nature and is localized under the plantar surface of the heel.⁹ It is commonly experienced upon weight bearing after a period of rest. This pain is most noticeable in morning with the first few steps and is often described as 'first-step pain'.¹⁰ In some cases, the pain is so severe that it results in an antalgic gait. However it lessens with increased activity but tends to worsen towards the end of the day or prolonged weight-bearing. Patient usually reveals a history of barefoot standing/walking or jobs which require prolonged weight-bearing.¹¹ Sometimes recent history of increased activity or even sudden weight gain is also present.

Plantar fasciitis is considered as a self-limiting condition. However the typical resolution time is anywhere from 6-18 months or sometimes longer.¹² Conservative management is reportedly very successful.^{6,12,13} Cryotherapy, therapeutic ultrasound with or without phonophoresis, electrical stimulation, whirlpool and administration of NSAID through iontophoresis are said to be effective.^{14,15} Recently published clinical practice guidelines reported that although weak, but there are evidences which support that manual therapy is effective in the management of heel pain.¹⁶

METHODOLOGY

The study design was experimental study and different subject design. It was conducted in the Out-patient Department of Physiotherapy, Sri Aurobindo Institute of Medical Sciences, Indore. 30 subjects who fulfilled the inclusion and exclusion criteria were equally divided into two groups by random sampling method. The total duration of study was 3 weeks. An informed consent was taken from each subject prior to participation. Then they were evaluated for pain and disability using Numeric Pain Rating Scale (NPRS) and Foot Function Index (FFI) before and at the end of the study. Foot Function Index (FFI): It is a self-report questionnaire with three subscales for pain, disability and activity-limitation. This scale consists a total of 23 questions. High scores indicate greater disability or decreased function. The test-retest reliability of FFI total and sub-scale scores is 0.87-0.69.¹⁷

Numeric Pain Rating Scale (NPRS): An 11-point NPRS (0, no pain; 10, worst imaginable pain) was used to measure pain intensity. Numeric pain scales have been shown to be reliable and valid.^{18,19,20}

Inclusion Criteria:

1. Age group 40-55 years
2. Both sex groups
3. Experienced symptoms for at least 4 weeks or more
4. NPRS score of more than or equal to 4

Exclusion Criteria:

1. Radiological evidence showing calcaneal spur
2. Any acute inflammation in ankle-foot region
3. Red flags to manual therapy (i.e. tumor, fracture, osteoporosis)
4. Prior surgery to distal tibia, fibula, ankle joint or rear foot region
5. Prior physiotherapy treatment

Group A (Conventional therapy): Subjects were treated with

1. Ultrasound with an output of 1.5 w/cm² for 7 minutes using a continuous mode with a frequency of 3MHz.
2. Stretching : calf muscles
3. Stretching : plantar fascia

4. Strengthening exercises for intrinsic foot muscles:
 - Standing toe curls
 - Towel toe curls
5. Ice pack for 10 minutes.

Group B (Manual therapy): Subjects were treated with

1. Mobilization : Ankle-foot complex
 - Talocrural joint posterior glides
 - Subtalar joint lateral glides
 - Subtalar joint distraction manipulations
 - 1st Tarsometatarsal joint Ant/Post glides
2. Stretching : calf muscles
3. Stretching : plantar fascia
4. Strengthening exercises for intrinsic foot muscles:
 - Standing toe curls
 - Towel toe curls

Patients of both groups were instructed to follow a home-exercise program including strengthening exercises for intrinsic foot muscles and self- stretching of plantar fascia and calf muscles. They were also advised to use soft-heel footwear, avoid prolonged standing, walking barefoot and not to take any other treatment or medications.

RESULTS AND TABLES

The dependent variables were NPRS and FFI. Pre-treatment scores for pain and disability were recorded on the first day. Then treatment was given to both groups and their post-treatment scores were recorded on the last day.

Unpaired t-test was used to examine changes in the dependent variables.

p-value < 0.05 is taken¹ up² for statistical Mean ± SD for disability at pre-treatment was 41.01 ± 5.85 and 42.67 ± 5.90 for group A and group B respectively and ‘t’ calculated value was 0.77 at n + n -2 degree of freedom. Data analysis demonstrated no statistically significant difference between the two groups.

Whereas, mean ± SD for disability at post- treatment was 6.20 ± 1.96 and 4.16 ± 2.20 for group A and group B respectively and ‘t’ calculated value was 2.68 at n + n -2 degree of freedom. Data analysis demonstrated

statistically significant difference between the two groups.

DISCUSSION

The results of the present study showed that manual therapy is more effective in improving pain and disability in patients with plantar significance at n + n-2 degree of freedom fasciitis. This is in accordance with the previous studies done by Cleland JA et al²¹ and Young B

Table 1: Pre and Post treatment comparison of both the groups in terms of pain (NPRS).

Parameters	Pre		Post	
	Group A	Group B	Group A	Group B
Mean ± SD	6.53±1.68	6.80±1.68	2.27±1.53	1.00±1.07
p value	0.62		0.01	
t value	0.5		2.62	

Mean ± SD for pain at pre-treatment was 6.53 ±

1.68 and 6.80 ± 1.68 for group A and group B respectively and ‘t’ calculated value was 0.50 et al²² who support the use of manual physical therapy as superior approach in the management of plantar heel pain. Young B et al concluded in his study that patients of heel pain who were managed with manual physical therapy reported clinically meaningful reduction in pain and dysfunction.²²

In plantar fasciitis, the fascia undergoes degeneration and becomes tight thereby leading to hypomobility within the ankle-foot complex, especially talocrural, subtalar and 1st tarsometatarsal joints. Limitation of talocrural at n+n-2 degree of freedom. Data analysis joint dorsiflexion, would require compensatory demonstrated no statistically significant difference between the two groups.

Whereas, mean ± SD for pain at post-treatment was 2.27 ± 1.53 and 1.00 ± 1.07 for group A and group B respectively and ‘t’ calculated value was movements at more distal joints to allow forward progression of leg over the foot during stance phase of the gait. This could theoretically decrease the height of medial longitudinal arch, therefore potentially increase tensile stress 2.62 at n+n-2 degree of freedom. Data through the plantar fascia. Although talus has analysis demonstrated statistically significant difference between the two groups.

Table 2: Pre and Post treatment comparison between both the groups in terms of disability (FFI).

calcaneus to rotate inwards (into varus) and the medial arch to elevate properly, in the later part of the stance phase.

Michelsson O et al²⁸ concluded that, calf stretching is effective in improving function in plantar fasciitis and should be used in the later part of the stance phase.

Parameters	Pre-treatment Group A	Pre-treatment Group B	Post-treatment Group A	Post-treatment Group B
Mean FFI	41.01±9.89	42.67±5.90	36.20±1.96	41.16±2.20
p value	0.49		0.01	

The rationale behind using calf stretching in plantar fasciitis is to improve dorsiflexion range of motion and thereby releasing the stress on plantar fascia during push-off phase of gait cycle.

Limitations of the study

- The study was done on a small sample size
- Study was conducted over a short period of time
- No follow-up could be done to see the long term effects

CONCLUSION

Thus, the present study concludes that manual therapy approach is superior to conventional therapy in improving pain and disability, in individuals with plantar fasciitis.

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ETHICAL CLEARANCE: We certify that this study involving human subjects is in accordance with Helsinki declaration of 1975 and has been approved by the relevant ethical committee.

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No direct muscle attachments, many muscles cross the talus and can influence the mechanics of talocrural, subtalar and 1st TMT joint. Both triceps surae and plantar fascia attach to the calcaneus and cross these joints. Likewise capsular restrictions in the talocrural and subtalar joint may also affect talar mechanics and have an influence on ankle dorsiflexion. Thus it is assumed that improvement in Talocrural, 1st TMT and subtalar joint mobility may contribute to normal joint mechanics and pain-free movement.

It has been argued that manipulative procedures play a major part in regaining the range of movement or function of the joint.²³ Lantz contends that ‘the importance of passive mobilisation and manipulation lies in the restoration of gross movements and accessory movements, which cannot be gained by patients through exercises alone, and certainly not by rest.’ The biomechanical basis of foot manipulation as outlined by Mennell predominantly focuses on the use of Foot Mobilisation Techniques to improve range of motion in hypomobile joints.²⁴ This approach is also favoured by Michaud.²⁵

Strengthening plays an important role in the treatment of plantar fasciitis and correct functional risk factors such as weakness of intrinsic foot muscles. Plantar fasciitis is often attributable to poor intrinsic muscles strength and poor force attenuation. Boyd HS et al (1992) in his study found that strengthening exercises for intrinsic foot muscles were cited as one of the most helpful treatment in heel pain. Strong intrinsic muscles thereby help in supporting the arches of the foot.

Digiovanni BF et al supported the use of plantar fascia specific stretching as a key component of treatment for plantar fasciitis.²⁶

Stretching reduces the tension in the fascia, which becomes tight during plantar fasciitis. Thereby it recreates the windlass mechanism²⁷ by optimizing the tissue tension. Thus, it allows the toes to dorsiflex, the

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HEALTH PROMOTIONAL NEEDS OF STROKE SURVIVORS OF DELHI AND NCR REGION

Dharam P. Pandey¹, Naresh Kumar², Meenakshi Rajput³, Anuj Mishra⁴, Afiya Sadiq⁵

Authors Detail:

1: Dharam P. Pandey

Director & HOD

BLK Center for Advance Physiotherapy

Sports & Neurorehabilitation

BLK Super Specialty Hospital, New Delhi

Corresponding Author

drdprehab@gmail.com

2: Naresh Kumar

Director & HOD

SBK Stroke & Paralysis Care Center

MSS Hospital

3: Meenakshi Rajput

Director & HOD

Department of Physiotherapy & Rehabilitation Sciences

Jaipur Golden Hospital, New Delhi

4: Anuj Mishra

Sr. Neurophysiotherapist

BLK Center for Advance Physiotherapy

Sports & Neurorehabilitation

BLK Super Speciality Hospital, New Delhi

5: Afiya Sadiq

Neurophysiotherapist

Department of Physiotherapy & Rehabilitation Sciences

Manipal Hospitals, New Delhi

Abstract

Background:

Stroke is the world's third highest cause of death and a major cause of disability. The impact of stroke on an individual stroke sufferer are often left with a resultant disability. Physically disabled individuals, including those who have suffered a stroke, are highly susceptible to develop secondary health complications arising after a primary disability caused by stroke. In stroke patient's secondary complications not only include contractures, spasticity and pressure sores but also include psycho-social adjustment to depression, isolation and environmental issues such as architectural inaccessibility. Health services should be orientated towards the prevention of secondary complications and the enhancement of the health status of stroke patients by encouraging a habitual lifestyle that involves health-promoting behaviors. A general health behavior curriculum should be provided as a service to all those living with physical disabilities.

The objective of this study was to find out what are the health-related behaviors of stroke patients in various hospitals and health centers in the National Capital Region and what factors influence the engagement of the stroke patients in these health-related behaviors.

Material and Methods:

The study was conducted in the National Capital Region of India (Delhi, Noida, Gurgaon). This region includes several districts, with each district consisted of many government as well as private hospitals and nursing homes the setting for the current study was National C apital Region of India. The total 127

subjects were recruited from 43 physiotherapists who were identified from, nursing homes, hospitals and physiotherapy center across National Capital Region of India. We included the patients age group between 25 to 70 years with chronic stroke more than 1 to 2 years.

We developed the health-related questionnaire. We re-examined the questionnaire and outlined the major sections. The questionnaire comprised of the following seven sections.

Results & Conclusion:

The findings of this study indicate that most of the participants were indeed involved in poor health behaviors including sedentary lifestyles and substance usage such as alcohol and smoking.

Rehabilitation professionals need to recognize that although functional independence is an important goal resulting behaviors may be detrimental to the health and quality of life of patients who have suffered a stroke, if health promotion interventions are not implemented with urgency. It is of utmost importance to note that education, social support and identity adjustment among physically disabled individuals with stroke have a significant impact on the health-related behaviors that they choose to engage in. Rehabilitation professionals therefore need to foster positive attitudes among these stroke patients and motivate them as well as offer relevant information to their family and friends during the rehabilitation process. Considering the long period of time that individuals who have suffered a stroke spend with physiotherapists compared to other health professionals, there exists a responsibility and window of opportunity for the physiotherapist to initiate individualized health promotional strategies, early in the rehabilitation program.

Key words: Stroke, Health Promotion, Disability, Rehabilitation

Background:

Stroke is the world's third highest cause of death and a major cause of disability. The impact of stroke on an individual is vast and stroke sufferers are often left with a resultant disability. Physically disabled individuals, including those who have suffered a stroke, are highly susceptible to secondary health complications which may arise after a primary disability. In stroke patient's secondary complications do not only include contractures, spasticity and pressure sores but may also include other impairment like which are often found in various neurological disability such as psycho-social adjustment to depression, isolation and environmental issues such as architectural inaccessibility¹⁻³ (According to the National Guideline on Stroke and Transient Ischemic Attack Management, depression and feelings of isolation should not be overlooked and should be attended to at outreach rehabilitation services such as the health centers, rehabilitation clinics, day program or home visits by members of the stroke team / home based care team. The occurrence and severity of secondary conditions can further limit a person's ability to perform essential life tasks and social roles⁴. In addition to being predisposed to secondary complications, stroke patients often also have predisposing illnesses that have been identified as modifiable risk factors for stroke. These illnesses include hypertension, diabetes mellitus, cardiac disease and hyperlipidemias. Excessive alcohol use and smoking have also been identified as modifiable risk factors for stroke⁶.

The modifiable risk factors and secondary complications can be further aggravated by the lifestyle the person engages in following a stroke. The choice of lifestyle an individual affected by a disability engages in, often has an impact on the individual's quality of life⁷. A habitual lifestyle that involves health-promoting behaviors such as proper medication usage, being physically active and good hygiene, certainly enhances an individual's health status. On the other hand, practicing health risk behaviors which include physical inactivity, poor hygiene and smoking, are potential dangers, which often result in poor health conditions and ultimately a poor quality of life⁸⁻⁹.

Although health services should be orientated towards the prevention of secondary complications and the enhancement of the health status of stroke patients by encouraging a habitual lifestyle that involves

health-promoting behaviors. A general health behavior curriculum should be provided as a service to all those living with physical disabilities.

Patients who have suffered a stroke form a large group of individuals with neurological deficit accessing the community health centers, hospital, physiotherapy and rehabilitation centers and nursing homes in National Capital Region. Services offered at these centers include primary health care services, which consist of preventative, promotive, curative and rehabilitative aspects. The rehabilitative services offered to the individuals with stroke, include mainly physiotherapy and occupational therapy. Individuals who have suffered a stroke require a rehabilitation program to function at the highest level possible, to maintain optimal health, and to adopt an altered lifestyle¹⁰. Therefore, by incorporating health promotion interventions into rehabilitation program, individuals could be more effectively empowered to take control over their own lives. Although health promotion has been recognized as a component that needs to be included in the provision of health services at these Health Centers, the emphasis is still on curative and rehabilitative aspects and less on the preventative and promotive aspects. The needs, including the health promotion needs of stroke patients are not known. The purpose of the present study is therefore to determine these needs to assist the shift of services from a curative to a promotive one. Addressing the health promotion needs of the stroke patients could form a vital part of the rehabilitation of these stroke patients. "In restructuring health promotion services for people with disabilities, rehabilitation professionals are challenged to assume the roles of collaborator, educator, researcher, and program provider".

This study attempts to identify factors that influence the health-related behaviors of people who have suffered a stroke. Most secondary complications are exacerbated by a poor choice of lifestyle¹¹. Therefore, efforts in health promotion intervention should place an emphasis on participation in health-promoting behaviors such as participation in physical activity, while refraining from health-risk behaviors, like tobacco smoking and poor eating habits. Currently, the health care personnel labor force, mainly the rehabilitation sector, is overextended because of a small number of health care personnel, less recognition and independent responsibility is not placed, and the possible increase in physical disabilities because of stroke. The views of the participants in the study on issues to promote their wellness-enhancing behaviors could help to prevent the occurrence of additional secondary disabilities. This could certainly improve the quality of rehabilitation by decreasing morbidity rates, which may result in lower health care costs.

Aim and Objective:

The objective of this study was to find out what are the health-related behaviors of stroke patients in various hospitals and health centers in the National Capital Region and what factors influence the engagement by the stroke patients in these health-related behaviors.

Material and Methods:

The study was conducted in the National Capital Region of India (Delhi, Noida, Gurgaon). This region includes several districts, with each district consisted of many government as well as private hospitals and nursing homes the setting for the current study was National Capital Region of India.

The total 127 subjects were recruited from 43 physiotherapists who were identified from, nursing homes, hospitals and physiotherapy center across National Capital Region of India. We included the stroke patients age group between 25 to 70 years with chronic stroke more than 1 to 2 years. We did not differentiate the side of involvement thus with either side of the body affected were also recruited. Patients were excluded from the study if they had severe cognitive impairment, communicative deficits because of a stroke and those who were non-co-operative. A total of 88 patients were recruited from the

Delhi, 7 from the Noida, and 32 from the Gurgaon, all the participants accessed their primary healthcare provider at health center either for medication, rehabilitation services or follow-up medical care.

We developed the health-related questionnaire. We again re-examined the the questionnaire and outlined the major sections. The questionnaire comprised of the following seven sections.

Once the draft was written the questionnaire was subjected to a peer view, by 3 senior physiotherapist and 2 general physician who were knowledgeable in the field of health promotion and stroke management. The peer review brought to the researcher's attention the need to include a separate section on support, thus the section included to allow participants to express any views they had on the issue of support and what support they feel they need since having a stroke. It was suggested that a question relating to whether participants have access to transport, be added to the original questionnaire. If participants indicated that they did have access to transport, they had to indicate whether it was private transport or public transport. If participants did not have access to transport they had to indicate how they then get from point A to point B. Suggested options provided for this question were, walking, using a wheel-chair and forced to stay at home because of lack of transport. Another suggestion was that The questions relating to the socio-demographic status of the patient, information relating to stroke such as how long ago they suffered the stroke, what side of the body is affected, were they admitted to hospital post stroke and the rehabilitative services the participants received. Disability related characteristics along with the socio-demographic, about the general health/lifestyle of the stroke patients, participants' knowledge about stroke. whether health care professionals educated them about what a stroke is, the causes of stroke, how to prevent a further stroke as well as the prevention of secondary complications, what support (physical and emotional) the stroke patients felt they needed post stroke, including who they felt should be providing the support, about physical activity, 'Do you participate in any kind of physical activity or exercise like walking, gym, exercising in a stroke group on a regular basis, patient's awareness of secondary complications in stroke. Each patient was interviewed by the physiotherapist. Physiotherapist instructed and give training on telephone how to administer the questionnaire.

A cross sectional survey was the design used for the quantitative aspect of the study. Surveys have been defined as 'systems for collecting information to describe, compare, and predict attitudes, opinions, values, knowledge and behavior.

The survey was carried out in 2017 at various Hospitals, health center, physiotherapy center in NCR.

Completing most questionnaires in the comfort of the participants' homes, made them feel more at ease and allowed more time to be spent with each participant, thereby gaining maximum input from everyone. Numerous questionnaires were also completed at the various physiotherapy/occupational therapy departments at various health centers. All questionnaires in these cases were completed by the participants either before or after the treatment session so that not to interfere with the participants exercise regime.

Descriptive statistical analysis using Microsoft Excel was employed to obtain a profile of the study population. Means, standard deviations and percentages were calculated for descriptive purposes and the chi-square test was used to test for associations between various variables. Various relationships between the socio-demographic characteristics (age, gender, education, employment status and disability-related characteristics) were illustrated using frequency tables. Several health-related behaviors and factors that influence these behaviors were analyzed using chi-square tests, where the association between these various variables was determined.

A total of 103 participants completed the questionnaire for the study. A total of Four questionnaires were omitted from the study, as certain sections of the questionnaire were not completed. 99 questionnaires

were therefore completed correctly and were eligible for data analysis. This yielded a response rate of 99.2%

Results:

Most of the participants (93.4%) were married.

Table 1 Illustrated the n (%)

Marital status of participants

Marital Status	
Married	93
Divorced/separated	7
Single	3
Total	103

MANUAL THERAPY AND TAPING TECHNIQUES FOR ILIOTIBIAL BAND SYNDROME(ITBS)

PROF.UMASANKAR MOHANTY

B.P.T (Hons), M.P.T(Manual Therapy), PhD, S.R.P(U.K),M.I.S.E.P (USA), F.A.G.E
Founder President, Manual Therapy Foundation of India®
President, The Indian Association of Physiotherapists (National Affairs)
www.mtffi.net

A few observation and much reasoning lead to error;
many observations and a little reasoning to truth.

Nobel Laureate Alexis Carrel

(Renowned Vascular surgeon and Author)

PROLOGUE

Shailja(name changed)a 18 year-old female athlete complained of intermittent pain of 3 months duration, located on the **lateral aspect of the right knee**. There was no reported history of trauma to the lower limb. She complained of **episodes of burning pain, lasting 10 to 15 minutes** several times a week. In the lateral aspect of the knee invariably "**creaks**" were felt. **Walking upstairs and running** were mentioned as **major precipitating and aggravating factors**. On examination, **tenderness over the left lateral femoral epicondyle** was found. **Palpation** of the same area also revealed a **peculiar creak** which was felt when the **knee was actively flexed to 35°**.

The patient showed normal passive and active ranges of motion at the right knee joint, but **mild to moderate pain occurred between 20° and 50° of active and passive flexion**. Postural analysis revealed bilateral Genu varum, pronation of the feet, lateral pelvic tilt towards the right side and lack of pelvis shift with the right lateral flexion of the trunk. **Muscle testing showed shortness of the right tensor fasciae latae (Ober's test position)**. McMurray's test, tests for joint stability and all "standard" orthopaedic tests of the knee joint were unremarkable. Neurological and pertinent radiographic signs were all normal. A diagnosis of **Iliotibial band syndrome** was made.

Treatments consisted of 15 to 20 minutes of **cryotherapy** applied to the local point of tenderness at the right femoral epicondyle, **stretching of the tensor fasciae latae by Muscle Energy Techniques** and support provided by taping techniques. The patient was asymptomatic after 4 treatments in a week period.

ILIOTIBIAL BAND: ANATOMY AND PATHOMECHANICS (Fig.1)

The **iliotibial band (ITB) or tract** is a **lateral thickening of the fascia lata in the thigh**. It consists of **dense connective tissue** that assists **stance stability** and is capable of **resisting large varus torques at the knee** (Kirk KL et al, 2000, Hamill J et al, 2008). The ITB proximally splits into superficial and deep layers, enclosing tensor fasciae latae and anchoring this muscle to the iliac crest (Strandring, 2004). The ITB also provides an insertion for the **tensor fascia lata and**

gluteus maximus muscles proximally(Kaplan EB, 1958). Distally the ITB is generally viewed as a band of dense fibrous connective tissue that passes **over the lateral femoral epicondyle and attaches to Gerdy's tubercle on the anterolateral aspect of the tibia.**

The iliotibial band is an independent stabilizer of the lateral knee joint, essential for erect posture. The iliotibial band has 2 significant attachments, one the **lateral epicondyle of femur and the other Gerdy tubercle** (Kaplan, 1958; Fairclough et al.,2006). The first iliotibial band attachment is into the distal femur at the upper edge of the lateral epicondyle(Vieira EL et al., 2007). The histologic makeup is consistent with tendon and has a layer of adipose tissue underneath the iliotibial band attachment area(Fairclough et al. 2006; Fairclough et al.,2007). The **adipose tissue contains pacinian corpuscles, is highly vascular,** and may be the site of the inflammation that causes pain during compression. The second attachment of the iliotibial band is the insertion into the **Gerdy tubercle of the tibia** and serves as a **ligament in structure and function.** The Gerdy tubercle attachment is **tensed during tibia internal rotation** as the knee flexes during the weight-acceptance phase of gait(Fairclough J et al.2006; Fairclough J et al.,2007; Kelly A et al.1994). **Internal tibial rotation explains the occasional connection between toeing in and iliotibial band strain** (Reischl et al.,1999).

Fairclough et al (2006) described a **mechanism of compression of the iliotibial band against the lateral epicondyle that occurs at 30° of knee flexion.** Their anatomic description included the observation that **compression of the adipose tissue at the lateral epicondyle of the femur caused pain and inflammation but that no anterior–posterior movement of the band moving over the epicondyle took place,** simply an approximation of the iliotibial band into the lateral epicondyle as the knee internally rotated during flexion from an extended position. The investigators presented an anatomical viewpoint that contradicts the commonly held theory of a friction syndrome . Fairclough et al (2006) described friction as an unlikely cause of ITBS, because the band inserts deeply and strongly into the femur. The functional anatomy may be relevant because **a fat pad and pacinian corpuscle compression mechanism** may have different mechanoreceptor implications compared with a friction syndrome, although inflammation remains the primary concern.

CLINICAL PRESENTATION OF ITBS(Fig.2)

The **first detailed case on ITBS** was published by **Renne in 1975.** The subjects studied were **military recruits** whose running and training activities had increased rapidly. Hallmarks of ITBS were pain on **weight bearing at 30° of knee flexion and the exacerbation of pain after having run more than 2 miles or having hiked more than 10 miles.**

ITB friction syndrome is an **overuse injury well recognized as a common cause of lateral knee pain.** It is particularly common in **runners and cyclists,** though it also occurs in **weightlifters, skiers and soccer players** (Orava, 1978;Noble, 1979; Orchard et al. 1996). The incidence is reported to be as high as **12% of all running-related, overuse injuries** (Fredericson & Wolf, 2005).

The following are the **clinical presentations** of ITB friction syndrome

1. Patients typically present with **tenderness over the lateral femoral epicondyle(Fig.3).**

2. A **Sharp, burning pain** when the practitioner presses on the **lateral epicondyle during knee flexion and extension** (Ekman et al. 1994).
3. The **pain is particularly acute** when the **knee is at 30° of flexion** (Orchard et al. 1996; Fredericson & Wolf, 2005).
4. The **symptoms are felt** usually in the **weight-bearing positions**.
5. The **pain gets accentuated with overtraining**.
6. There are significant **deficit in hip abductor strength, mostly of gluteus medius** muscle. (Fredericson et al, 2000)
7. Clinically the **ITB is found to be tight**(Miller et al.,2007). Confirmation done by **Ober Test(Fig. 4)**.

The Ober test is commonly performed to assess iliotibial band length. Gose and Schweizer(1989) describe the Ober test as follows: (1) position the patient on side, lying with the tested leg up; (2) with the knee flexed to 90° and the pelvis stabilized, position the hip in a flexed and abducted posture; (3) extend the hip to achieve adequate extension so that the iliotibial band is over or behind the greater trochanter; and (4) allow the thigh to fall into adduction . The iliotibial band restriction is designated as follows: **(a) minimal (adducted past the horizontal but not fully to the table), (b) moderate (adducted to the horizontal), and (c) maximal (patient is unable to adduct to the horizontal)**.

8. The **Noble compression test (Fig.5)**produces the **pain**.

Noble compression test is used to **provocate symptoms by compressing the iliotibial band at the lateral epicondyle with 30° knee flexion**. The patient is positioned with the knee at 90° flexion, and compression is applied just proximal to the lateral epicondyle as the knee is extended toward full extension. The **30° flexion is the impingement zone** specific to the iliotibial band and lateral femoral epicondyle as described in cadaver studies by both Orchard et al(1996) and Fairclough et al(2006).

MANUAL THERAPY AND TAPING TECHNIQUES FOR ILIOTIBIAL BAND SYNDROME(ITBS)

1.Positional Release Technique for ITBS (Fig.6)

The technique is applied in case of **irritable condition**.

Subject's position:- The subject is in side lying position.

Clinician's position:- The clinician stands at the posterior aspect of the subject.

Procedure:- 1. The clinician places the thumb at the painful area located in close vicinity to the lateral epicondyle.

2. The clinician places subject's ITB in relaxed position (subject's knee in 60 degrees of flexion, Hip 30 degrees of abduction and 20 degrees of lateral rotation).

3. Mild pressure(directed anterior, medial and inferior) in comfort zone is applied by the clinician's thumb for 90 seconds.

4. The technique is performed 3-4 times.

Clinical Significance: The positional release technique relaxes the irritability by acting at the spinal cord level.

In addition to the PRT at the irritable area, **focussed cryotherapy** can be applied by **tennis ball wrapped in socks** and kept in freezer(**Fig.7**).

2. Muscle Energy Technique for ITB (Fig.8)

Subject's position:- The subject is in side lying position (affected side placed up).

Clinician's position:- The clinician stands at the posterior aspect of the subject.

- Procedure:-**
1. The subject is asked to flex the non affected side hip close to the chest.
 2. The clinician stabilises the affected side pelvis, abducts the hip for 40 degrees and extends the hip.
 3. The clinician brings the hip further towards adduction.
 4. Once the barrier is reached the subject is asked **to bring the hip for flexion and abduction** while the clinician is applying the resistance($1/3^{\text{rd}}$ of the muscular effort with isometric contraction).
 5. The contraction is held for 6-10 seconds and repeated for 6-10times.

Clinical Significance: MET facilitates the lengthening of the tight IT band, so that it minimises excessive stress at the lateral epicondyle of femur.

3. Myofascial Release Technique for lower ITB (Fig.9)

Subject's position:- The subject is in side lying position.

Clinician's position:- The clinician stands at the posterior aspect of the subject.

- Procedure:-**
1. The clinician places the lateral aspect of the thumb 2 inches superior to the lateral epicondyle of the femur.
 2. The clinician applies the force medial and slides down along the ITband towards the Gerdy's tubercle.
 - 3.

The sequence is repeated 6-10 times.

Clinical Significance: MFR facilitates to release the contracted collagens in ITBS.

4. Taping Techniques for ITBS (Fig.10,11,12)

Subject's position:- The subject is in side lying position with hip and knee both placed in 30 degrees of flexion.

Clinician's position:- The clinician stands at the posterior aspect of the subject.

- Procedure:-**
1. The clinician places cut piece of ethaflex(2inches length and $1/2$ inch width) at the distal part of ITB.
 2. The paper underwrap is applied to secure the ethaflex.
 3. The rigid brown tape is applied on top of the underwrap.

Clinical Significance: The rigid tape reinforced with the ethaflex provides adequate support to the compromised distal part of the IT band.

Alternately elastic **kinesiology tape** is applied. A 3 inch long kinesiology tape(2inches width) is taken. The edges are rounded off and an incision is given in the middle. The tape is stretched further by 10 percent and applied to the distal part of the IT band(**Fig.13**)

5.Self Stretching (Fig.14)

Subject's position:- The subject is in standing position.

Procedure:- 1. The subject holds the dorsal aspect of the foot and the knee is fully flexed.

2. The hip is taken for 20 degrees of adduction and 20 degrees of extension.

3. The stretch is felt at the distal part of the ITB.

4. The stretch is maintained for 6-10 seconds and repeated for 6-10 times.

Clinical Significance: Self stretching elongates tight Iliotibial band.

6.Exercises to Recruit the Gluteals(Medius and maximus)

As per the observations of Fredericson et al, 2000 the hip abductors are weak in ITBS. Therefore the exercises facilitating the **recruitment and strengthening of the Gluteus medius and maximus** must be demonstrated and the subject is instructed to perform on regular basis.

The following are the important exercises.

A.Resisted clam shell is a beginning-level exercise for gluteal muscle recruitment(Fig.15)

B.Resisted hip abduction and bridge is a beginning level exercise that facilitates gluteal recruitment(Fig.16).

C.Resisted hip extension, external rotation, and abduction comprise a beginning-level exercise that facilitates gluteus maximus and gluteus medius recruitment(Fig.17)

D.Resisted staggered squat is an intermediate exercise to facilitate gluteal muscles and an alternative functional stance(Fig.18)

CONCLUSION:

Iliotibial Band Syndrome remains a common and challenging dysfunction in many athletes; but, through early diagnosis and proper biomechanical movement analysis, appropriate skilful manual therapy interventions can be implemented to decrease pain and to improve function.

ACKNOWLEDGEMENTS :

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Immediate Effect Of Musical Low-Intensity Aerobic Exercises Vs Conventional Care In Reducing Postpartum Depression And Insomnia In Young Aged Primi Gravidae Of Rural Area

Mishra Ruchi¹, Jha Sanjeev²

¹Associate professor, Ujjain Institute of Paramedical Sciences, R.D.G.M.C.; ²Principal and Professor, Ujjain institute of paramedical sciences, R.D.G.M.C, MP, India.

Background: Research studies have ascertained postpartum depression and sleep disorder as risk factors, chronically affecting women's health in rural area after childbirth producing deleterious impact on family life and development of infant. Although proper exercises plan with nutrition seems to have positive impact on mental health. Thus the present study has been carried out. **Aim:** The present study aims to assess the comparative effect of musical aerobic exercises and conventional care to reduced PND and sleep problems. **Methods:** In present experimental study, around 20 rural women (malwa region) of post-partum period, for upto 2 week, were randomly selected on the basis of inclusion criteria. First reading on Edinburgh post-natal depression scale (EPDS) and Athens insomnia scale is taken on 2nd day of delivery with reassessment after 10 sittings in hospital admitted patients. **Data analysis** was performed using paired t- test via SPSS 17.0 significance level of the test was also considered $p \leq 0.05$ the results showed that both post natal depression and insomnia decreases significantly after two weeks ($p = 0.001$). **Conclusion:** The study concluded that musical aerobic exercise can improve mental health and insomnia in young aged primi gravidae of rural area.

INTRODUCTION

Post-natal period is the period beginning immediately after the birth of a child & extending for about six weeks¹ Pregnancy and post-natal period are considered as most delicate period for a women's life, when she is more susceptible to become mentally

unwell, the most frequent form of maternal morbidity following delivery¹⁵. After child birth, dramatic drop in hormones (estrogen & progesterone) in body is responsible for post natal depression and sleep disorders¹⁶. Post-partum depressive symptoms negatively affect the quality of life and have a detrimental

effect on mother- infant relationship contributing towards child's cognitive and emotional lacking/deprivation.¹⁴

Recent studies epitomized that Post natal depression rates have increased significantly over the past 50 years up from 8% in 1950s to 27% in 21st century.² These studies were more or less were conducted on urban educated population whereas in indian scenario with rural area population this may affect on broad level which may be left undocumented and untreated. Maternal mental ill health and its cure is one of the untouched part of post-natal rehabilitation ¹⁵. Providing psychological support is one of the most important need of the time in order to prevent the mother from this mental depressed state. Thus this study is designed to investigate the postpartum depression (PPD) and sleep problem among primi gravida mothers after 2nd day of delivery.

Simultaneously few studies were conducted to prove the effect of regular exercises and physical activity on decreasing mental disorders in women^{2,4} Aerobic exercise is known to enhance mood & cognitive function in women. Music intervention, listening to playing a instrument, has also been show to improve depression & cognitive function. Music have

varied effect on the auditory & endocrine system. Music melody & rhythm can simulate nerve impulses through the limbic system the thalamus & reticular activating system (RAS) thereby affecting the neuroendocrine system in humans, recently exercise has been shown to increase brain-derived neurotrophic factors. An exercise program with rhythmic music that stimulates increased brain-derived neurotrophic factor & immune parameters resulting in a reduction in depression symptom. In this study, the researcher develop a moderate exercise program that integrates rhythmic music, called MAE with a maximal heart rate (HRmax) . HR(max) is calculated by karnoven formula of $(220 - \text{age})^{11}$.

Therefore in the present study, we intend to investigate the effects of two weeks of musical aerobics exercises on depression and sleep disorders in women with post-natal period

Literature Review

The search of the literature was made in MEDLINE database for up to recent studies. Original articles, reviews, surveys, clinical trials and investigations pertinent to the research were considered for this study.

Shokri et al (2014) investigated the effects of 8 weeks of aerobics exercise on depression anxiety and sleep disorder. The study was conducted over 16 middle aged women who voluntarily participated and underwent regular walking for 8 weeks, 3 sessions per week, each session lasting for 60 minutes with 60% of max heart rate. This concluded that aerobic exercise can improve mental health and enhance life quality in middle aged women.

Zagade and Deshpande, 2013 assessed the level of depression in postnatal mothers using Edinburgh scale over 60 mothers in post natal period. This was concluded that prevalence of post natal depression is more in age group 21-25 years.

Glavin K, Smith L, Sørnum R (2009) conducted the study to identify Prevalence of postpartum depression in two municipalities in Norway. The objectives of this study were to describe the prevalence of postpartum depression (PPD) in two Norwegian municipalities and (ii) to investigate whether mothers' age and parity are related to the development of PPD. A total of 2227 women, 437 from M1 and 1790 from M2 participated in the study where The Edinburgh Postnatal Depression Scale (EPDS) at well baby

clinics 6 weeks after delivery has been completed. However, there was a significant difference between the municipalities, with a prevalence of 14.4% in M1 and 9% in M2. Primiparous mothers showed a higher prevalence than multiparous mothers did, and the oldest mothers (36 years and over) showed the highest prevalence of PPD

Savarimuthu, 2009, conducted a qualitative study from rural south India where 137 women in the post-partum period were assessed using the Edinburgh Postnatal Depression Scale and a semi-structured interview to diagnose ICD 10 depression. This study proves that few social and cultural factors including age less than 20 or over 30 years, schooling less than five years, thoughts of aborting current pregnancy, unhappy marriage, physical abuse during current pregnancy and after childbirth, husband's use of alcohol, girl child delivered in the absence of living boys and a preference for a boy and low birth weight have a major impact on post-partum depression.

J.R.W Fisher conducted the study to To examine depressive symptomatology in women after childbirth at Setting Hung Vuong

Obstetrics and Gynaecology Hospital and the Maternal, Child Health and Family Planning Centre of Ho Chi Minh City, Vietnam. Total of 506 women who participated, out of which 166 (33%) had EPDS scores in the clinical range of >12 and 99 (19%) acknowledged suicidal ideation. In a forward stepwise logistic regression analysis, 77% of cases with EPDS scores >12 were came with Depressive symptoms.

Anoop S, 2004, conducted the study to determine whether current and postpartum maternal depression and low maternal intelligence are risk factors for malnutrition in children. The interactions between current maternal depression and low birth weight and between postpartum depression and low maternal intelligence were statistically significant. This study concluded that there is evidence for an association between postpartum maternal depression, low maternal intelligence, and low birth weight with malnutrition in children aged 6-12 months.

Aims and Objective

Aims:-

- To assess the effect of music aerobic exercise to reduced PND and sleep problems.
- To assess effect of usual care & active exercises to reduced PND and sleep problems.

Objective:-

- To reduce PND and sleep problems.
- To improve quality of life of females.

Methodology

The present experimental design study aimed at assessing the effect of musical aerobic exercise in comparison to conventional care to reduced PND

Source of data :-

R.D.Gardi medical college & Hospital Ujjain(m.p.)

Duration of study :-

The total duration of treatment programmed was 2 week with regular sitting per week. The first assesment after 2ndday of delivery & reassessment done at end of

last week. Normally delivered females were asked for longer stay for upto 2 weeks in IPD with permission of respective department.

Sample size:-

Total number of patient is 20 out of which 10 females were randomly selected in each group on the basis of inclusion & exclusion criteria.

Outcome measures:-

- Edinburgh post-natal depression scale (EPDS).
- Athens insomnia scale .

Inclusion criteria :-

- Patient with age 20 to 25 year females.
- primi gravida .
- EPDS scoring must be... and athens insomnia scale
- Post-natal period between 2nd day- 2 weeks (immediate post-natal period).
- Husband income must be up to 10,000 monthly
- Mother education 1st-10th class.
- Normal delivery

Exclusion criteria :-

- Caesarian section.
- Multigravida.
- Any psychotic disorders or any other medical problems.
- Women whose babies died.
- Patient having drug dependency.

Procedure

In the present study 20 normally delivered primi gravidae were

selected from Gynae IPD, R.D. Gardi medical college and hospital, Ujjain. Which are recruited in 2 groups by cluster random sampling used in different group.

In this study patients with PND is selected. selection of patients according EPDS and Athens scales. The written consent was signed by the participants. The patient divided into two groups according to inclusion criteria. Participants were assigned randomly into experimental & comparison group, The participants were also informed that MAE exercise was specifically for the experimental group & active exercise for the control group, along with usual care was required during the study course. Group A (experimental group) consist of 10 patients & group B (control group) consist of 10 patients.

Pre & post-exercise test included depression scores on EPDS, and sleep problems scores on ATHENS, are measured before beginning of treatment & after ending of treatment, re-assessment done to detect changes in the outcome indicators.

Scale conducted questionnaire interview.

Treatment process took about 30 minutes for each participant. The experimental group received a regular schedule of musical aerobics exercises (30 minutes, for two weeks), whereas the control group received a regular schedule of musical active exercises (30 min, for two weeks) & usual care.

After this the depression was recorded by EPDS the participants were asked to mark their intensity of depression on EPDS in data collection sheet with 0 to 30.

Where 0- 10 symbolized minor depression 10- 20 - symbolized moderate depression, 20 - 30 symbolized severe depression.

Treatment regime for group A: -

Warm-up stage 10 reps each with two quiet music song followed by :-	Active exercise 20 reps each with fast rhythm followed by :-	Cool-down stage active stretching exercise 3 reps with 30 sec hold with two quiet music followed by :-
<ul style="list-style-type: none"> • pelvic rotation in standing • Leg curl • Knee extension • Ankle movements • Neck rotation • Shoulder • Elbow movements • Wrist movements • Waist rotations 	<p>March stepping V- shape stepping 3 Δ - shape Step touch :- (Note :- 5 second rest between two exercise)</p>	<ul style="list-style-type: none"> • Hamstring stretching . • Quadriceps stretching • Calf stretching :-. • (Note:- 5 second rest between every repetition). <p><i>Meditation.</i></p> <ul style="list-style-type: none"> • . Based on the psychological analysis during study period (during session of exercises), psychological counselling was done at the time of discharge to make process more effective. • <i>Deep breathing exercises :- 10 repetition</i>

Treatment regime for group B: -

Conventional Care	Active Exercise 10 Reps Each
<ul style="list-style-type: none"> ○ Eat confinement food , avoid cooling stuff such as cold drinks ,fruits. ○ Do not diet. ○ Have ample rest , catch up on short naps 	<ul style="list-style-type: none"> • shoulder joints movements • Neck movements • Elbow movements • Wrist movements.

<p>throughout the day.</p> <ul style="list-style-type: none"> ○ Have a post-natal massage for relaxation, reduced stress & also to relive from body aches. ○ Maintain proper hygiene especially on your cesarean incision. ○ Take a quick hot bath once a day. ○ Do not shy to ask for help. ○ Have some personal time, ○ Talk other mums. ○ Live in joyful environment. ○ Try to avoid more stress. ○ Talking with baby & making bonding. Find someone ,you can talk to. 	<ul style="list-style-type: none"> ● Finger exercises. ● Hip movements. ● Knee movements. ● Ankle movements. ● Toes movements. ● Slow walking :- 5 minutes. ● Deep breathing exercises :- 2 minutes. ● Meditation with music :- 5 minutes.
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STATICAL ANALYSIS

Analysis of data collected with Athens score and EPDS of 20 subjects. Suitable statistical analysis test was used in order to verify the investigation of the study. Statistics was performed using the software package SPSS 17.0. The characteristics of the data are represented through tables. Pre and post test scores of ATHENS SCORE and EPDS were analyzed using paired t-test within the group. Independent t- test was used to find out any significant difference between groups A and B. Significance level was defined at $P < 0.05$.

RESULT

Then after the interventions, i.e. after the 14 sessions , the patients sleep is measured through ATHENS SCORE and depression level measured by EPDS SCORE .

Pre- and post-treatment comparison had been done by Paired t-test for both the parameters. Comparison between the groups had been done by unpaired t-test.

TABLE NO. 1

BASELINE CHARACTERISTIC OF PARTICIPANTS		
Variable	Group A(Exp)	Group B(Con)
Female	10	10
Age/Year	21.80	21.30

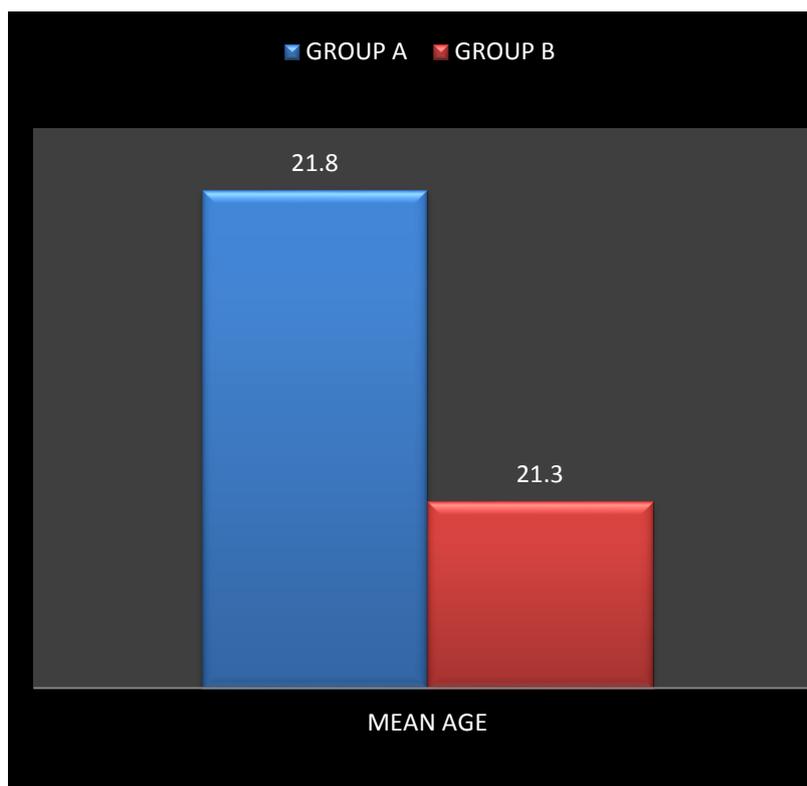


TABLE NO. 2

BOTH GROUP PRE VALUE

	GROUP A MEAN	GROUP B MEAN	SD	T- VALUE	p- value
ATHENS SCORE	8.50	10.80	2.83	-2.570	.626
EPDS SCORE	12.90	13.90	4.71	.671	.519

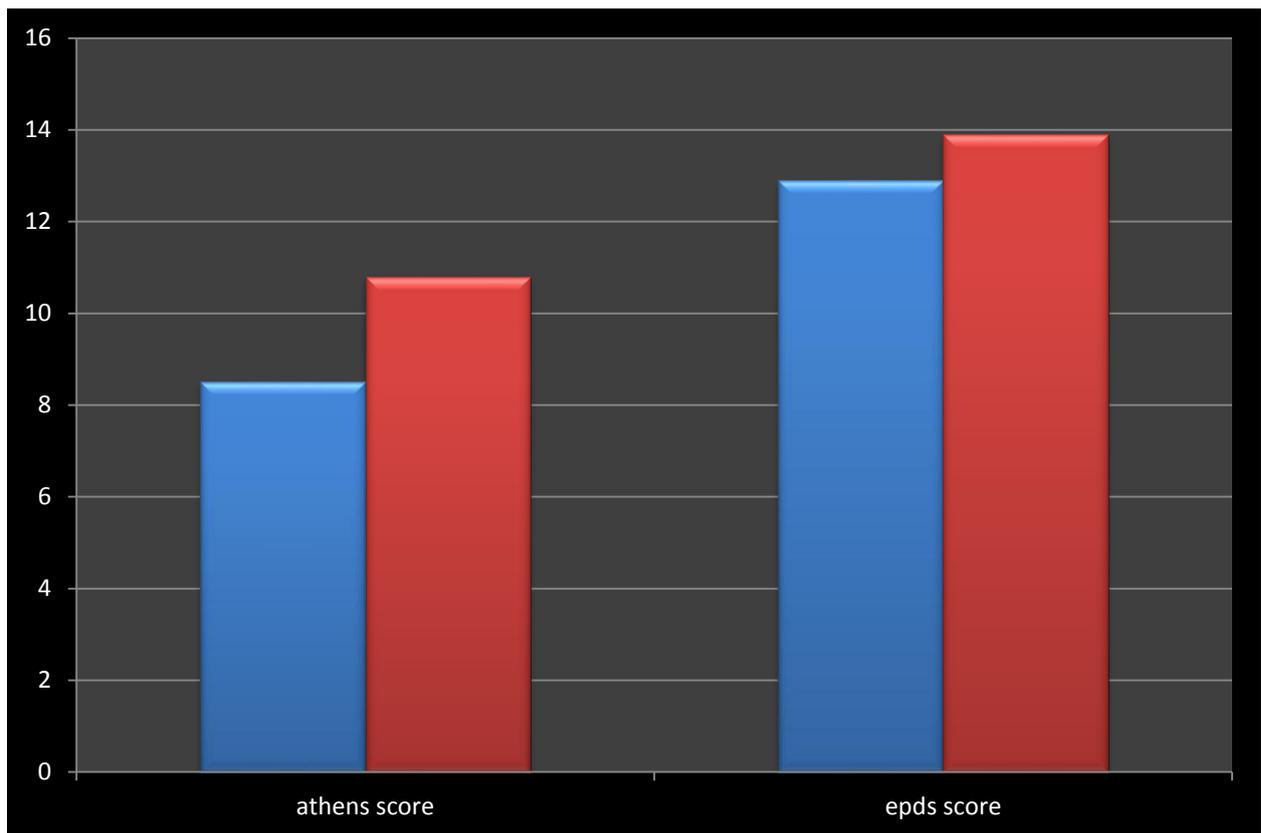


TABLE NO.3
BOTH GROUP PRE AND POST VALUE

	GROUP A		GROUP B		SD		T-VALUE		p-value
	MEAN		MEAN		PRE	POST	PRE	POST	
	PRE	POST	PRE	POST					
ATHENS SCORE	8.50	0.40	10.80	4.20	2.83	2.65	15.3999	7.071	.000
EPDS SCORE	12.90	2.80	13.90	9.30	4.71	4.11	13.50	9.36	.000

ATHENS SCORE

EPDS SCORE

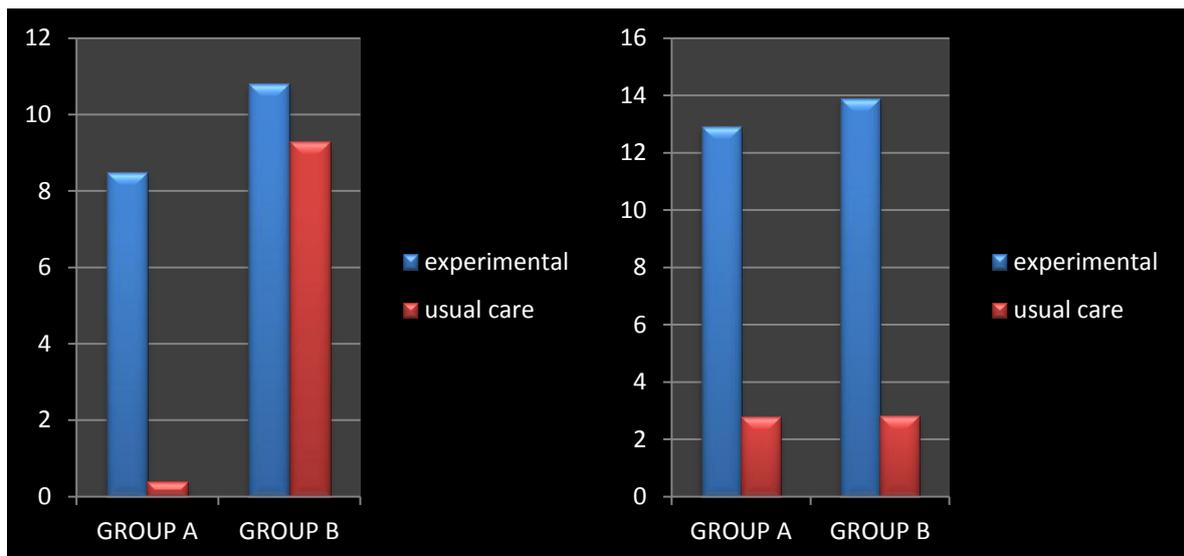
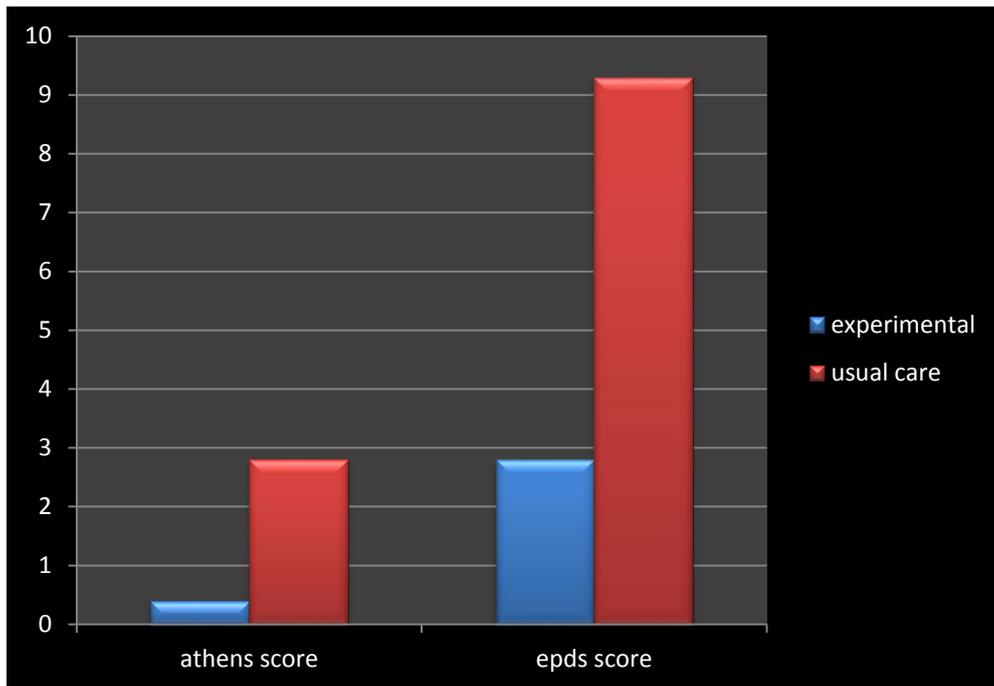


TABLE NO.4
BOTH GROUP POST VALUE

	GROUP A MEAN	GROUP B MEAN	SD	T- VALUE	p- value
ATHENS SCORE	0.40	4.20	2.65	-4.520	.001
EPDS SCORE	2.80	9.30	4.11	-4.993	.001



DISCUSSION

The study was performed for 2 weeks. MAE & conventional care results reduction in PND and sleep problems. We developed a moderate exercise program with music called music aerobic exercise (MAE), which is easy to follow exercise. Study conducted among depressed women participants in intervention study ,which show that exercise has a significant impact in lowering the depression. It is associated with an increased level of certain chemicals in the brain through brain neurotransmitters called endorphin which interact with brain receptors to reduce pain & stabilized body temperature.¹² Thus, we combined music with moderate aerobic exercise to benefit human immunity & mental functioning. Music can influence the physiological & psychological response of its listeners. Some kind of music can even relieve pain, reduced anxiety & promote sleep quality. We also found that the combination of music & exercise enhanced immunity, induced the release of beneficial hormones such as brain - derived neurotransmitters factors (BDNF) & decreased depression symptoms¹¹.

Exercise training reduces stress and depression. One of the most effective mechanism in reducing depression due to exercise training can be increased levels of serotonin and norepinephrine, which results in endorphin release and cortisol reduced secretion. Probably increased levels of endorphin,

nor epinephrine and serotonin followed by a decrease in cortisol secretion were one of the reasons of reduced depression ³.

Effect of aerobics exercise on psychological and physiological mechanisms such as increased feeling of self - efficiency, perceived self-control, reduced stress and physiological responses to stress and useful effects on brain's neurotransmitter are assumed to affect psychological health. Some also believe that regular exercise participation keeps mind away from negative thoughts. Exercise helps people feel better about their appearance and this can be an effective means of psychotherapy and counseling in decreasing sleep problems and depression ^{3,8}.

CONCLUSION

While conducting the study more significant changes were seen in GROUP A and less changes in GROUP B. Thus, this study established that musical aerobic exercises are more effective than active exercises with conventional care.

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Short Commentary

HARPREET S SACHDEV, M.P.T.

MIHIR SOMAIYA, MPT

Physiotherapist, India

hsneuropt@gmail.com

Role of menthol infused Kinetic tapes in Lymphoedema management

Introduction:

The human lymphatic system comprises lymphatic vessels and lymph nodes running parallel to the circulatory system. Lymphoedema occurs when there is an imbalance due to reduced lymph transport capacity leading to accumulation of interstitial fluid and protein. This failure of lymphatic system to adequately transport excess water, proteins and waste products away from the affected area results in a chronic inflammatory response manifesting as swelling, and lead to skin and tissue changes. This abnormal accumulation of protein rich interstitial fluid resulting from insufficient lymphatic drainage has serious multiple, disabling and chronic sequelae too. Secondarily proliferation of neutrophils, macrophages and fibroblasts along with accumulation of collagen leads to chronic inflammation and fibrosis. Apart from reported deleterious effects on patients physical and psychological well being, it has been widely documented that lymphoedema affects body image, reduces self esteem, causes pain, discomfort, functional impairments, depression, anxiety and problems with sexual, familial and social relationships. Lymphoedema increases the risk of cellulitis and frequency of hospitalization.

Cancer related lymphoedema commonly occurs after treatment of breast cancer, with a prevalence of 6-54%. Upper limb lymphoedema occurs in 24 – 49 % of cases with total mastectomy and in 2 -49 % of cases with axillary lymph node dissection. Cancer related damage to the lymphatic system occurs as a result of surgery, radiotherapy or progression of the neoplastic disease.

Physical therapy, accepted as a gold standard therapy, in various duration, frequency and settings has been shown to have a positive effect on the management and maintenance phase of lymphoedema. A program combining

skin care, manual lymphatic drainage, exercises and compression therapy is recognized as the best practice in lymphoedema management. Although practice routinely uses bandaging, patients do not adhere to treatment with Multilayer compression Bandages, as its use makes them feel like prisoner to the disease and brings back the negative memories of cancer and its treatment. Standard care and management also have significant economic consequences, require frequent bandage changes and the expensive compression hosiery drain available resources, having economical consequences. Treating cancer related lymphoedema also must take into consideration the climatic considerations of a country, with majority of patients disliking the treatment due to hot and humid conditions.

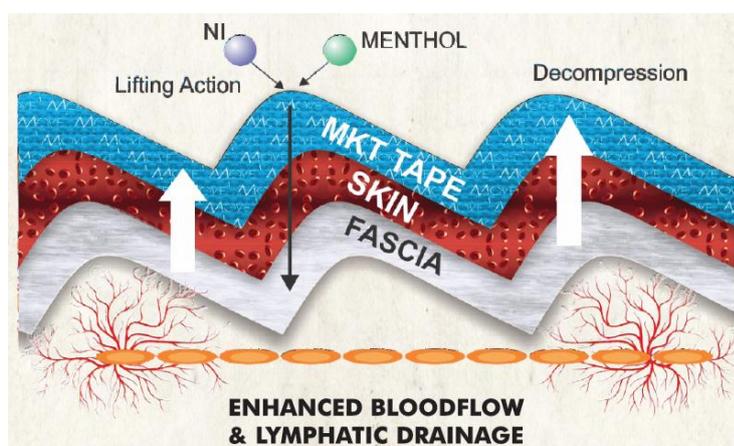
Well-documented, promising and inexpensive methods from alternative medicine are still needed. It is important to have safe, effective and evidence based treatment options. Move kinetic taping (MKT) could be recommended in advanced cancer related lymphoedema when bandaging may not be tolerated, or is contraindicated due to pain or because it reduces the patients quality of life. Taping is also extremely useful on body parts where garment fitting is problematic. Taping can be used in addition to compression bandaging to cross-watersheds. MKT causes significantly less discomfort, difficulty and inconvenience than bandaging. Also Move kinetic tapes can be recommended in hot and humid conditions where bandages may be uncomfortable. Other advantages are that a patient can take a shower without taking the tape off. Patients can wear it from 1 – 4 days (for cotton tapes) and 1 to 8 days (for synthetic or rayon tapes) and even longer.

Wound protection is a major problem with kinetic taping. Because of the adhesive characteristics of the kinetic tape, putting on and removing the tape in lymphoedema therapy requires particular attention. There is a higher possibility of allergic reaction to tape and skin inflammation in area of kinetic tape application if adequate precautions and sensitivity testing are not done prior to application.

Mechanism of action:

Move kinetic tapes have been suggested as a promising treatment option for acute sport injuries, musculoskeletal disorders and also edema. One of the physiological effects of the tape is decongestion of lymphatic fluid accumulated under the skin. Move kinetic tapes can provide directional pull that guides the lymph fluid in the desired direction of drainage. This is important in routing and rerouting the lymphatic fluid in the lymphatic vessels, and thus reducing swelling and edema. After applying the kinetic tape, the taped area will form convolutions to increase the space between the skin and muscle. Once the skin is lifted, the flow of blood and lymphatic fluid is promoted. Application of kinetic tapes increases the pressure difference within lymph vessels, increases the flexibility of underlying connective tissue, and also induces a micromassaging effect.

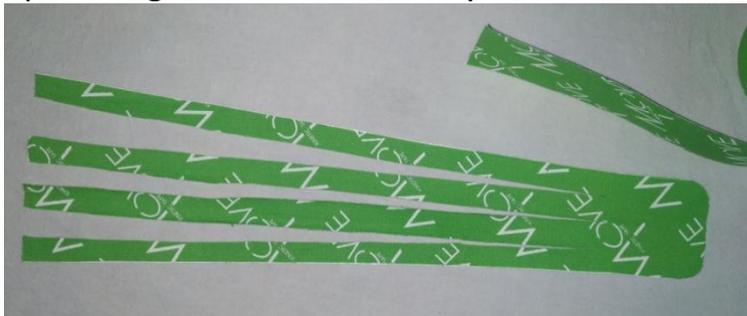
In addition the taping addresses fascia and myofascia which connects musculoskeletal, neural, visceral & vascular systems. Fascia, a largely forgotten structure is addressed by appropriate taping methods to either hold the fascia in place or creating movement. MKT reduces pain by reducing the increased mechanical tension in the region of inflammation, edema and swelling by fascial unloading and Move “lift”; as the elasticity of the tape produces wrinkles in the skin and thus indirectly increasing the interstitial space between the layers of fascia, resulting in unloading effects. (fig-1 below explains mechanism of action)



(Fig – 1: Skin lift and wrinkles with Move Kinetic Taping)

Method of application:

Move lymphatic Correction "Move Canal" or "Channeling" techniques are used to create areas of decreased pressure under the MKT Tape that act as channels to direct the exudate to the nearest lymph duct. Tape is applied with the base near the lymph node to which the exudates is to be directed, and the remaining tape is applied in a fan-like pattern with none to very light, or 0-15% of available tension. The Move Kinetic tapes are applied to facilitate lymph drainage towards anterior trunk, posterior trunk, towards the unimpaired side. A premeasured and sized tape of fan shape application (fig-2) is taken. Firm anchor/ base with no tension is applied near the area of draining lymph nodes, with tails of the tape applied to anterior, medial and posterior aspects of the limb (figure-3,4) with 5 – 15 % tension, followed by anterior and posterior chest. A classical complication of dysfunctional lymphatic system is accumulation of large quantities of metabolic waste, the move kinetic tapes application naturally channelize and pass it through the nodes as drainage points. Activating the lymphatic channels helps in better filtering of toxins and optimizing functional efficiency.



(fig -2 – typical fan shaped application of MKT)



(fig 3,4 – limb application; draining to cubital and axillary lymph nodes)

We here propose an adaptation to the conventional taping, menthol infused tapes, the **Move Kinetic Tapes (MKT)** have additional adjunct beneficial effect over the mechanical and sensori motor effects. The addition of *menthol*, with its cooling and analgesic properties, functions as a counter – irritant. Findings also suggest that the negative ions within the tape, absorbed through the skin could easily relieve pain and inflammation, and accelerate the healing due to tissue damage.

Conclusion:

The mechanism of action and mode of application of MKT suggests it to be an effective, economical and therapeutic supplement to standard care in management of lymphoedema due to dysfunctional lymph drainage post cancer and surgeries. Further clinical research is needed to validate the findings.

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MEASUREMENT OF EFFECTIVENESS OF PNF AND BALANCE TRAINING ON GAIT AND BALANCE IN OLDER ADULTS

Chitranshi Tomar¹, Nusrat Hamdani², Tarun Lala³

Abstract

Study design: Pre test - Post test experimental design

Objectives: Older adults or elderly are the human beings who are going through the process of ageing, which represent as accumulation of changes comprising physical, psychological and social changes. Walking is the most efficient function which declines with ageing. In this study we aimed to evaluate effect of two exercise program on balance and gait.

Methods : In this study 40 subjects of age 60-75 years of age who have difficulty in walking were participated and allocated into two group PNF group(n=20) and balance training group(n=20).One group was treated with PNF training and other group with balance training by biodex for 4 weeks. Outcome measures were timed up and go test, berg balance score and gait parameters which were assessed before and after the intervention.

Results: Result of the study shows that both the intervention are highly effective in improving Berg balance score and timed up and go score. Both the intervention are also effective in improving gait parameters such as cadence, average speed which improves the mediolateral margin of stability and backward margin of stability.

Conclusion: Both the interventions are effective to improve balance and gait among older adults.

Keywords: Biodex, PNF

¹Post -graduate student, Department of rehabilitation sciences, Jamia Hamdard, New Delhi, India

²Assistant Professor, Department of rehabilitation sciences, Jamia Hamdard, New Delhi, India

³Assistant chief physiotherapist Indraprasth Apollo hospital New Delhi, Rehab Advisor, Indian Head Injury Foundation (IHIF)

PNF is an approach to therapeutic exercise that combine functionally based diagonal pattern to the technique of neuromuscular facilitation to evoke motor responses and improve neuromuscular control and function. PNF techniques are used to develop muscular strength and endurance, facilitate stability, mobility, neuromuscular control and coordinate movement¹. Proprioceptive receptors present in muscles, tendons and joints are the special sensors sensitive to stretch or pressure helps in awareness of position of feet and legs by sending Proprioceptive inputs to brain. Proprioceptive cues from the ankles determine the

body's movement or sway relative to standing surface (hard, soft, and slippery). Using this Proprioceptive inputs brain sends feedback information to muscle and joint to move and make the adjustments to body position to maintain balance and coordination

Balance is an ability to maintain centre of gravity on base of support⁵. Balance plays a major role in walking and it is the primary contributor of stable walking. Older adults needs to put more attention on the complex task of walking if not, they are at risk of fall which is likely followed by serious injuries. Internal factors related with fall injuries are divided into physical and psychological factors; physical factors include decrease muscle strength of the lower extremities, and decreased gait ability, balance ability, grip strength, and sensory motor adjustment, and sensory decline like vision and psychological factor and depression, anxiety and fear. Decrease in muscle strength is the main contributory factor for balance and gait disability resulting from aging. Muscle strength decreases about 25% - 30% after the age of 60, and such muscle strength weakness results in decrease in the entire muscle fibers and the size^{26, 27}.

The incidence of fall in the elderly ranges from 25% to 35%, and the probability of recurrent falls in people with a history of falls is 52%. In India, the prevalence of falls among older adults aged 60 years and older was 14% to 53%⁹. The WHO reported that the fall-related mortality rate for India is 2.1 per 100,000 people. A basic aim of exercise science is to improve the function of a system through exercise; the exercise must stimulate that system. . Many rehabilitation programs are put together for older adult which involve strength training, balance training, gait training, yoga, tai chi to improve balance and physical fitness in older adult. With advancement of technology, advanced equipment Biodex balance system is used for balance training. It is a multi-axial device used for treatment and assessment of balance and stability. Biodex balance system assist patient in controlling their centre of gravity over base of support. The instant biofeedback system makes it easy for the patient to relate to and repeat the motions, also it provide safe controlled environment.

METHOD

Participants

The study population is a representative sample of the population living in the New Delhi, India.

The protocol was approved by the ethical committee of Jamia Hamdard University, New Delhi and participants signed informed consent.

Inclusion criteria

Age- 60 -75years, Able to walk with or without aids, having difficulty in walking and balancing, MMSE score 24 or more, Berg balance score 45 or less, MMT score 3 or more

Exclusion criteria

Not able to walk, Subject with severe sensory deficit, any deformity (scoliosis, genu varum, genu valgum, equinus), any vestibular disorder

Groups

Subjects selected for research were allocated into two groups, group A and group B each group having 20 subjects.

Outcome measures

Gait parameters - step length, stride length, stance phase, swing phase, cadence, gait cycle, speed

Balance - Berg balance score, Timed up and go score, Modified fall efficacy scale.

Forty subject of age between 60-75 years was selected on the basis of inclusion and exclusion criteria and divided into two groups, 20 subjects in each group; and the informed consent have been signed by each the subjects. Pre intervention evaluation is done by gait analysis on OPTOGait photoelectric system, Berg balance score, timed up and go test, modified fall efficacy questionnaire.

- Group A (experimental group1) receive lower limb PNF training along with lower limb stretching 4 times a week for 4 weeks
- Group B (experimental group2) receive lower limb strengthening exercise along with balance training given by Biodex balance trainer 4 days a week for 4 weeks.

Post intervention evaluation is done after 4 weeks by taking gait parameter on OPTOGait photoelectric system, Berg balance score, timed up and go test, modified fall efficacy scale.

Comparison between the pretest and posttest readings to evaluate the changes in gait parameter, berg balance score, timed up and go test and modified fall efficacy scale.

Training

Group A (experimental group) receive lower limb PNF diagonal pattern along with stretching of lower limb muscle exercise 4 times a week for 4 weeks.

Diagonal pattern of lower extremity.

- D1 flexion : flexion-adduction-external rotation
- D2 flexion : flexion-abduction-internal rotation
- D1 extension : extension -abduction and internal rotation
- D2 extension : extension-adduction-External rotation

Technique⁴⁶

- Rhythmic initiation
- Dynamic reversal
- Combination of isotonic

Each movement is practiced 10 times with each technique with 2 minutes rest between each technique.

Group B (experimental group2) –balance training on biodex balance trainer.

- Postural stability training

- [Weight](#) shift training
- Percent weight bearing training **Conventional training** -
- stretching of lower limb muscles (hamstring, calf, adductors)
- static quadriceps 10 rept
- Dynamic quadriceps exercise 10 rept with 10 sec hold
- Straight leg raise 10 rept with 10 sec hold
- Abductor strengthening in side lying
- Hip extensors strengthening in prone

DATA ANALYSIS

Statistical analysis was done by SPSS software. ANOVA (One-way Analysis of Variance) followed by Tukey-Kramer Multiple Comparisons Test to compare the pre and post readings.

Results

A total of 40 subjects were included in the study according to the inclusion criteria by sample of convenience. They were allocated into 2 groups namely group A (PNF) group and group B (balance training) group.

Result is not statically significant due to less number of patient.

Discussion

This study compares the effect of PNF training and balance training on gait parameter and Balance in older adult of age 60-75 years. **Step length** – Step length in group A in which PNF training has been given decreases in both left (50.31 ± 2.16 - 48.45 ± 2.6) with 3.6% variation and right (50.09 ± 2.65 - 49.77 ± 2.87) with 0.63% variation between the pre and post training readings. Step length in group B in which balance training has been given on biodex balance trainer decreases in right (48.85 ± 1.88 - 47.77 ± 1.56) with 2.21% and increases in left (47.21 ± 2.23 - 50.70 ± 2.72) with 3.49% variation . There may be small difference between left and right limb parameter. Right and left limb are not mirror images of one another¹².

Stride length - Stride length in group A in which PNF training has been given decreases (99.14 ± 4.65 - 97.59 ± 4.68) with 1.56% variation and Stride length in group B in which

balance training has been given on biodex balance trainer decreases (96.06 ± 3.67 - 94.20 ± 2.82) with 1.93% variation .

Cadence – cadence in group A increases (88.3 ± 3.96 - 90.51 ± 3.84) with 2.50% variation and cadence in group B also decreases (90.97 ± 4.01 - 89.94 ± 5.14) with 1.13% variation. There is very minimal variation from its pre value in group B considered as no change from pre value.

Average speed - Average speed in group A increases (0.65 ± 0.05 - 0.66 ± 0.04) with 1.53% variation and Average speed in group B in decreases (0.72 ± 0.03 - 0.67 ± 0.05) with 6.9% variation .

Step length, Stride length and cadence can be different at a particular speed, studies says that an increase in cadence (stride frequency) and a decrease in stride length minimize the risk of falling.² Laura Hak et al in his study says that mediolateral margin of stability (ML MOS) increases with increase in cadence (stride frequency) and backward margin of stability (BW MOS) increases with decrease in stride length and increase in walking speed^{2, 3,4}. The margin of stability (MOS) is the distance between the extrapolated COM (XCOM) and the edge of an individual's BOS in which the XCOM represents the state of the COM taking into account both its position and velocity. MOS can be calculated in medio-lateral (ML) and backward (BW) direction. The ML MOS is the minimum distance in medio-lateral direction between the extrapolated centre of mass and the lateral border of the foot attained during foot-contact. The BW MOS is the distance in anterior-posterior direction between the XCOM and the posterior border of leading foot at initial contact

The result of this study proves that PNF training improves medio-lateral and backward margin of stability by decrease in stride length, increase in cadence and increase in walking speed. Michael S. Orendurff et al in his study says that mediolateral centre of mass displacement decreases with increased speed and vertical centre of mass increases with

increased speed. Walking speed is the function of both cadence and step length and increase in either cadence or step length contribute to increase walking speed⁵. D. D. Espy et al also through his study defined that shortening of step length with increase in gait speed has effect on maintenance of stability from slip onset to recovery of lift off. In his study he also says that faster gait and shorter step length ameliorate the risk of fall when slip occur by maintaining stability from slip initiation to lift off of recovery foot⁶.

Berg balance score (BBS) – the BBS score in group A increases (40 ± 1.17 - 45.6 ± 0.96) with 14% of variation Pvalue-0.001 and in group B also increases (42.22 ± 0.98 - 47.22 ± 0.80) with 11% variation P value - 0.005.

Berg balance score increases in both the group it signifies that balance ability of the patient improve by both the PNF training and balance training but its highly improved in group A(PNF training group) and mildly increased in group B. The reason of mild increase in BBS is less number of subjects in balance training group.

TUG – Timed up and go test score in group A decreases with (18.05 ± 1.52 - 14.75 ± 1.42) and variation 18.2% and in group B also timed up and go score decreases with mean deviation (15.22 ± 0.73 - 12.44 ± 0.44) with variation 18.26%. The result of this study suggest that after intervention timed up and go score decreases in both the group which indicate that subject in both group have improved balance and decrease fall risk **Stance phase and swing phase** – stance phase in both the group increases in group A in left leg (62.76 ± 2.07 - 69.64 ± 2.02) with 2.06% variation in right leg (67.96 ± 1.78 - 66.55 ± 1.46) with

-11% variation and in group B in left leg increases (65.90 ± 3.01 - 68.22 ± 1.34) with 3.27% variation in right leg (67.26 ± 2.88 - 69.46 ± 2.84) with 3.5% variation.

The swing phase decreases in group A left leg ($35.93 \pm 1.91 - 29.09 \pm 1.60$) with 19.03% variation increases in right leg ($29.81 \pm 1.61 - 32.15 \pm 0.91$) and group B decreases in left leg ($34.16 \pm 3.05 - 33.04 \pm 1.85$) with 12.06 variation increases in right leg ($31.32 \pm 2.78 - 32.27 \pm 3.10$) with 1.52% of variation. In both the group swing phase increases in right leg and decreases in left leg. Though gait is a symmetrical event but variation can be there in both the leg.

Gait cycle – gait cycle time increases in both the groups in group A ($1.34 \pm 0.05 - 1.50 \pm 0.13$) with variation in group B ($1.33 \pm 0.04 - 1.39 \pm 0.09$) with variation.

Gait cycle, stance phase and swing phase – Gait cycle is the duration of entire cycle which include stance phase and swing phase. Gait cycle is characterized by two brief periods of double limb support each lasting 10% of gait cycle in which both limbs are in contact with the ground. Stride duration is similar to gait cycle duration, the stance phase is similar to stance time, and the swing time is similar to swing phase. Stance time is the amount of time that passes during the stance phase of one extremity in a gait cycle. It includes single support and double support phase. Swing time is amount of time that passes during the swing phase of one extremity in a gait cycle. If the stride time of gait cycle is 1sec the stance time is 0.6sec and swing time is 0.4sec. The result of the study suggest that stride length decreases but gait cycle time increases that means though the stride length decreases but stride time increases which indicate that subject taking more time to balance before initiating swing phase or preparing for swing phase.

MFES – modified fall efficacy scale score increases in both the group in group A ($113.2 \pm 4.37 - 114.4 \pm 4.18$) with variation in group B ($116.61 \pm 2.29 - 119.77 \pm 2.20$) with variation

“A COMPARATIVE STUDY OF ULTRASOUND THERAPY AND KINESIOLOGY TAPING IN THE MANAGEMENT OF PAIN RELIEF IN FROZEN SHOULDER AT STAGE-II”

SURBHI JINDAL

Research scholar MPT

Department of physiotherapy Janardan Rai Nagar Rajasthan Vidyapeeth
University, Dabok, Udaipur-313022 (Raj.)

Dr. Shailendra Mehta, Principal

Department of physiotherapy Janardan Rai Nagar Rajasthan Vidyapeeth
University, Dabok, Udaipur-313022 (Raj.)

ABSTRACT

- ◎ **DESIGN**-Randomized clinical trial
- ◎ **AIMS AND OBJECTIVES**-This study compares the effectiveness of kinesiology taping and ultrasound therapy in frozen shoulder. The objective of this study was to find out the effect of kinesiology taping and ultrasound therapy in improving pain.
- ◎ **METHODS AND MEASURES**- 30 participants with frozen shoulder who were referred by orthopedician and willing to take treatment for 12 weeks, were recruited for the study. The subjects were screened and were put in either of 2 groups- Group A-**Kinesotaping** , GroupB-**Ultrasound therapy**. By Convenience Method. A written informed consent was taken from each participant.

The pre and post intervention assessment was done by using Visual Analogue Scale{VAS} , SPADI score , ROM assessment by universal Goniometry {abduction , flexion , lateral rotation and medial rotation}.

- ◎ **RESULTS**- VAS & SPADI were statistically significant for pain and disability (P <0.01) indicating greater improvements in both the groups for both the outcome measures. On comparing the pre and post test score the mean score showed greater improvement in pain and disability in group A receiving kinesiology taping technique then group B receiving ultrasound therapy. (P <0.01)
- ◎ **CONCLUSION**- In this study the aim was to compare the effectiveness of kinesiology taping and ultrasound therapy in the management of pain relief in frozen shoulder at stage-II along with conventional physiotherapy measures and home based exercise program used for the treatment of frozen shoulder. Based on the result of statistical analysis this study found that

kinesiology taping as compare to ultrasound therapy is more beneficial in improving shoulder pain associated with frozen shoulder.

KEY WORDS- adhesive capsulitis (frozen shoulder) , kinesiology taping , ultrasound therapy, VAS , SPADI.

INTRODUCTION

The shoulder is one of the most sophisticated and complicated joints of the body:

- To allow so much movement the joints need to be 'free' to move, therefore the shoulder should be unstable; However a series of complex ligaments and muscle keep it in joint. Because the shoulder is such a unique joint it is also prone to unique and complex problems. In fact it would be more correct to call it the SHOULDER COMPLEX.
- The deepest layer includes the bones and the joints of the shoulder.
- The next layer is made up of the ligaments of the joints.
- The tendons and the muscles come next.
- The nerves supply all the stuctures above and make them work.
- The bones of the shoulder consist of the humerus (the upper arm bone), the scapula (the shoulder blade), and the clavicle (the collar bone).

FROZEN SHOULDER:-

Also known as adhesive capsulitis is a “ chronic inflammation in the musculotendinous or synovial tissue such as the rotator cuff, biceps tendon , or joint capsule”

It is characterized by a stiff shoulder that has a considerable lack of function.

There are three stages of a frozen shoulder (adhesive capsulitis) Freezing , Frozen and Thawing.

First stage: The Freezing Stage

In these stage there is severe pain in the shoulder even at rest. There is also a decrease in shoulder external rotation and abduction ROM

These symptoms appear 2-3 weeks after onset of pain and can last from 10 to 36 weeks.

These symptoms of loss ROM are secondary to the pain and are not true capsular contractures.

Second stage: The Frozen Stage

In these stage , pain is no longer present at rest but only with movement.

There is decrease of capsular volume in the shoulder, which is reflective of loss of motion.

There is loss of motion in all plane ,and pain in all parts of the range. There may be evidence of atrophy of the rotator cuff, biceps, deltoids, and triceps brachii.

Typically this stage last 4 to 12 months

Third stage : The Thawing Stage

In these stage there is a slow but progressive recovery of ROM.

The recovery of ROM is due to capsular remodeling.

INDIVIDUAL RISK

- It is most common in women
- It affects 1 in 50 adults during their lifetime
- Most common age range is 40-60
- It usually occurs in non dominant arm
- 1 in 5 will experience in other shoulder too.

Kinesio Taping: It is a therapeutic taping technique which not only offers patients and athletes the support they are looking for, but helps to rehabilitate the affected condition as well. Using a highly specific tape design that works with the body, allowing full range of movements. In many cases range of movement will be improved.

- It can be worn 3-5 days, allows breathing of the skin and whisks away sweat.

ULTRA SOUND THERAPY:

- It is a sound wave that has a freq greater than 20KHz
- It is generated by applying an alternate current to a Piezoelectric crystal. This crystal contracts and expands at the same freq at which current changes polarity. The sound field generated by this crystal in turn makes the molecule in the sound field vibrate and oscillate.
- The crystal commonly used in US units is synthetic piezoelectric Zirconium Titanate (PZT)
- Therapeutic US has a freq range of 0.7 and 5.0 MHz
- Most clinics will have 1 MHz and 3 MHz sound head.

OPERATIONAL DEFINITION

- **VAS:** It attempts to represent measurement quantities in terms of a straight line placed horizontally on paper. The endpoints of line are labeled with descriptive or numeric terms to anchor the extremities of the scale and provide a frame of reference for any point in the continuum between them. 100mm VAS is used and patient is asked to bisect line at a point representing self assessed position on scale.
- **SPADI:** The Shoulder Pain And Disability Index {SPADI} was developed to measure current shoulder pain and disability in an outdoor setting. The SPADI contain 13 items that assess two domains; a 5-items sub scale that measure pain and an 8 item subscale that measure disability. There are two version of the SPADI; The original version has each item scored on a Visual Analogue Scale {VAS} and a second version has items scored on a Numerical Rating Scale{NRS}.
- **ROM :** Joints and their related structures are examined by performing active and passive joint motions. Joint motion is a necessary component of functional tasks. Careful examination of joint motion for range, end-feel, effect on symptoms, and pattern of restriction help identify and quantify impairments causing functional limitations, and determine which structures need treatment.

AIMS AND OBJECTIVES:

AIM: Aim is to find out that which technique is more effective in the management of pain relief in frozen shoulder

OBJECTIVE: To find out the effect of ultrasound therapy in frozen shoulder

To find the effect of kinesiology taping in frozen shoulder

HYPOTHESIS

There is a significant difference in the effectiveness of US therapy and kinesiology taping in patients of Frozen Shoulder

NEED OF STUDY

- Adhesive capsulitis is a common painful condition. Characterized by severe loss of mobility and shoulder pain. Patients with this disease have a painful restriction of both active and passive mobility and an overall loss of shoulder movement in all planes.
- Many studies have been done on the treatment of pain relief in frozen shoulder but no such evidence-based practice has been found on comparative study of ultrasound therapy and kinesiology taping in the management of frozen shoulder.
- So my intent of the study treats my subjects with ultrasound and kinesiology taping to find out significant improvement in management of pain relief in frozen shoulder.

STATEMENT OF THE PROBLEM

This study is done to find out the significant difference between kinesiology taping and ultrasound therapy in improving the shoulder pain associated with frozen shoulder.

REVIEW OF LITERATURE

ADHESIVE CAPSULITIS

Labbe A 12(2010) in his article on clinical suggestion adhesive capsulitis: “use the evidence to integrate your interventions” has suggested that Frozen Shoulder can be treated by using physical interventions like modalities, passive motion, and manual techniques, soft tissue mobilization, therapeutic exercise, rigid & kinesiotaping. Because adhesive capsulitis patients often exhibit poor posture and scapular mechanics, KT may provide postural cues and assist with promoting proper scapular motion.

By Tekavec 2012 walker 2004 : Adhesive capsulitis has been reported to affect slightly more women than men and occurs most commonly in middle age, with an increased frequency in people with diabetes.

According to [Giovanni Maria D’Orsi](#) , [Alessio Gai Via](#) , [Antonio Frizziero](#) , and [Francesco Oliva Sep- 2012](#) : Adhesive capsulitis is a condition “difficult to define, difficult to treat and

difficult to explain from the point of view of pathology". This Codman's assertion is still actual because of a variable nomenclature, an inconsistent reporting of disease staging and many types of treatment. There is no consensus on how the best way best to manage patients with this condition, so we want to provide an evidence-based overview regarding the effectiveness of conservative and surgical interventions to treat adhesive capsulitis.

ULTRASOUND

Allen 2006 and watson 2008: Therapeutic ultrasound delivers energy to deep tissue sites through ultrasonic waves { at 1 or 3 MHz freq and intensities between 0.1 watt/square cm } using a crystal sound head. Treatment can be delivered in forms , continuous { non stop ultrasonic waves} and pulsed { intermittent ultrasonic waves}.

Hamer and Kirk (25)1976 demonstrated that ultrasound combined with passive and active exercises gave patients improved pain relief and shoulder motion, others (8,6 1.64) report no significant therapeutic benefit associated with ultrasonic treatment.

Empiricism1976 suggests that if ultrasound is utilized, the shoulder joint should be stretched into abduction and external rotation during this procedure, effecting a prestretch of the anterior and inferior capsule (55).

KINESIOLOGY TAPING

Hacer Dogru, Sibel Basaran*, Tunay Sarpel 2008 said that as illustrated in various studies that taping be it adhesive or kinesiotaping are widely being used far biomechanical correction, for relief of pain or for immobilisation. Although there are various modalities which can help in reducing pain but present review shows that taping can be used as very useful tool for reducing pain. Further it is cheap, less time consuming and easy to manage with excellent results.

According to MAHMOUD MOHAMED NASSER 2012 Kinesio Taping and traditional exercises program have more significant effect than traditional exercise program only in the treatment of diabetic frozen shoulder.

According to [Jaraczewska E](#), [Long C](#). 2006 The Kinesio taping method in conjunction with other therapeutic interventions may facilitate or inhibit muscle function, support joint structure, reduce pain, and provide proprioceptive feedback to achieve and maintain preferred body alignment.

VISUAL ANALOGUE SCALE According to [Hasan Kerem Alptekin](#), [Tugba Aydın](#), [Enes Serkan İflazoğlu](#), and [Mirsad Alkan](#), PTAs a prompt evaluation of the perception of disease severity by the patient, VAS is a significant index that aids direct rehabilitation in the clinic. Concerning CMS, besides being a widely used, popular evaluation method, it can also be useful for evaluating the entire process of shoulder therapy and completing the clinical examination.

SHOULDER PAIN AND DISABILITY INDEX (SPADI)

[Marloes Thoomes-de Graaf, PT, MMT, MSc^{1,2}](#), [Wendy Scholten-Peeters, PhD](#), [Edwin Duijn, MSc](#), [Yasmaine Karel, MSc](#), [Henrica C.W. de Vet, PhD](#), [Bart Koes, PhD](#), [Arianne Verhagen, PhD](#) **2017** Evidence supports the use of the SPADI following shoulder arthroplasty and in adhesive capsulitis. It takes about 2-3 minutes to complete and correlates well with other region-specific shoulder questionnaires. Additionally, it's also shown to be responsive to change over time, in a variety of patient populations and is able to discriminate adequately between patients with improving and deteriorating conditions.

METHODOLOGY : 30 participants with frozen shoulder who were referred by orthopedician and willing to take treatment for 12 weeks , were recruited for the study. The subjects were screened and were put in either of 2 groups- Group A-Kinesotaping , GroupB-Ultrasound therapy. By convenience method. A written informed consent was taken from each participant. **Group A-**

Requires; 4 pieces of y tape

1 piece of l tape , Partner for taping

Group B

Participants of group B were given ultrasound in sitting in continuous mode and an intensity of 1.5 W/cm² for 10 minutes.

PROTOCOL

30 subjects were assigned in two groups 15 in each group (group A and group B).

Group was treated with kinesiology taping along with conventional physiotherapy measures (moist heat, TENS, IFT, codman's pendular exercises, finger ladder, shoulder pulley and home exercise regime program) and ultrasound therapy along with the same conventional physiotherapy measures.

Precautions were also taken with at work.

Outcome Measures

The pre and post intervention assessment was done by using Visual Analogue Scale{VAS} , SPADI score , ROM assessment.

Inclusion criteria:

- Affected by shoulder periarthritis for at Stage-II less than 3 months duration with
- _no major trauma.
- Stopped taking analgesics anti inflammatory drugs 15 days prior to electromagnetic therapy or physical therapy.
- Had never had infiltrative steroid therapy.
- Age 40-60years.
- Limited active and passive shoulder movement in all planes.
- pain with motion with a minimum visual analogue scale (VAS) score of 40 mm

- normal findings on radiographs of the glenohumeral joint and
- absence of arthritis, malignancy, and medical conditions such as cardiac diseases, infections and coagulation disorders.

Exclusion criteria:

- Patients having the history of shoulder girdle fracture , glenohumeral , dislocation , concomitant cervical spine symptoms, past shoulder surgery, rotator calf pathology.
- Shoulder gridle motor control , defects associated with neurological disorders. { eg stroke parkinson's disease.}
- Local corticosteroids injection to the affected shoulder with in the last 3 months.

TIME AND DURATION OF THE STUDY

Duration of the study was 12 weeks; 4 weeks of treatment and 8weeks of follow up; data collection is done at the end of every week.

STATISTICAL TEST:

An appropriate statistical test was applied for data analysis.
'Independent t-test' was used for comparing the two group
Paired t – test was used for comparison of pre and post test score

RESULT OF THE STUDY

There is significant improvement in shoulder pain after application of kinesiology taping as compare to ultrasound therapy. Both the groups (A & B) showed improvement in pain and disability but more improvements occur in group A as compare to group B which suggest that kinesiology taping is more beneficial than ultrasound therapy in shoulder pain associated with frozen shoulder along with conventional physiotherapy measures.

CONCLUSION

In this study the aim was to compare the effectiveness of kinesiology taping and ultrasound therapy in the management of pain relief in frozen shoulder at stage-II along with conventional physiotherapy measures and home based exercise program used for the treatment of frozen shoulder. Based on the result of statistical analysis this study found that kinesiology taping as compare to ultrasound therapy is more beneficial in improving shoulder pain associated with frozen shoulder.

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- Adhesive Capsulitis A Review of Current Treatment [Andrew S. Neviasser](#) MD, [Jo A. Hannafin](#), MD, PhD*(2010)
- Treatment of adhesive capsulitis: a review [Giovanni Maria D'Orsi](#),¹ [Alessio Giai Via](#),² [Antonio Frizziero](#),³ and [Francesco Oliva](#)²
- Therapeutic ultrasound for chronic low-back pain Safoora Ebadi,Nicholas Henschke,Noureddin Nakhostin Ansari,Ehsan Fallah,Maurits W van Tulder
- "A STUDY TO FIND OUT THE EFFECT OF ULTRASOUND THERAPY OVER SHORT WAVE DIATHERMY FOLLOWED BY CRYOSRETCH IN PATIENTS WITH ADHESIVE CAPSULITIS OF SHOULder "A COMPARATIVE STUDY" (2015)
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Vibration Therapy

Concept of Vibration Therapy



Vibration platform for the whole body.

The idea originated in space science: **BioMechanical Stimulation (BMS)** by means of whole-body vibration.

In 1856, Russian physician and inventor Gustav Zander developed a series of machines that utilized weights and pulleys to create a sense of vibration. The purpose of apparatus was therapeutic.

In 1895, Dr. John Harvey Kellogg implemented vibration therapy in his health practice.

With a vibration chair he developed himself, he claimed the therapy was good for circulation and could also alleviate constipation.

During the Russian space programme, Physicians noticed that the returning astronauts suffered from loss of bone mass & bone fractures at a much earlier age than was normal.

They began to use whole body vibration device to help strengthen astronaut's bone mass & muscles.

Today NASA uses VT to help prevent muscle loss in astronauts.

The Wave Nature of Matter

- In 1923 de Broglie suggested that if light has both wave-like and particle-like properties, shouldn't all matter?
- Specifically, he proposed that the *wavelength* λ of any particle is related to its momentum p by

$$\lambda = \frac{h}{p}$$

- For a matter particle, λ is called the *de Broglie wavelength* of the particle



Louis de Broglie
(1892-1987)

How does vibration therapy work?

Whole body Vibration

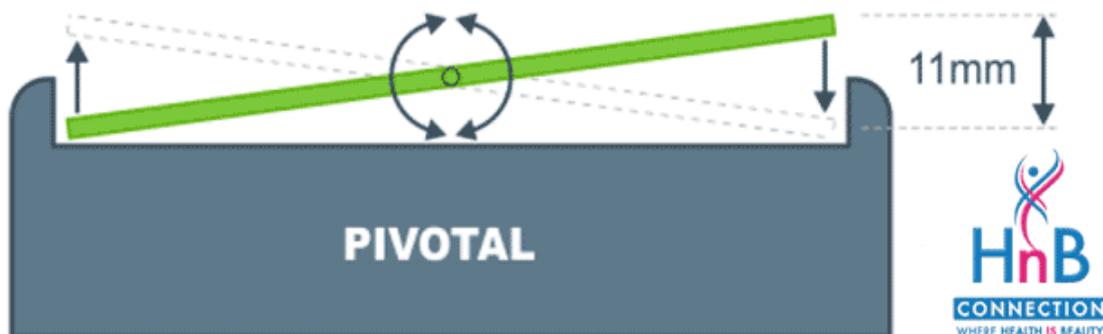
During whole-body vibration therapy, your therapist will ask you to stand, sit, or lay on a machine supported by a vibrating platform. For example, they may ask you to stand in a half-squat position with your knees bent.



Two types of W-Body Vibration Machines

- **Pivotal**

In Pivotal vibration machines, the platform you stand on tilts around a central pivot point like a see-saw. The left and right sides alternate up and down while the centre remains fixed.



- **Lineal**

In an attempt to compete with the successful German vibration platforms, a Dutch company created a vibration machine with a new kind of platform movement called Lineal.

A Lineal vibration platform remains horizontal at all times with the entire platform moving up and down by the same amount.



Technical Requirements for VT Platform

Frequency: 20-50Hz

Duration: 0-120s

Pause time: 0-120s

Intensity: low – high

Repetition: 1-20

Effects I

Muscles

Vibration plate triggers reflexes

Subconscious → Reflexes cannot be controlled

Increased recruitment of muscle fibres:

Vibration Plate: 90-100%

Normal: 60-70%

High performance sports: 80-90%

Example: Muscle Atrophy

(MS, Confinement to bed, Incontinency)

Tendon / Connectivity Tissue

Tissues taking on vibrations alternatively

Friction of different tissues against each other

→ releasing tissue adherences

Improved blood circulation

Effects II

Blood Vessels

- Improved mobility of blood vessels
- Improved circulation
- Improved metabolic function

- Improved removal of metabolic waste
- faster regeneration
- Example: Intermittent Claudication

Hormons

- VT influences the hormonal system positively
- Increased distribution of growth-hormons
- Increase of testosterone
- Increased production of neurotrophin
- Decreased production of cortisol

Effects III

Capsule &

Joints

- Balance (Vestibular system)
- **proprioception**, the process by which the body can vary muscle contraction in immediate response to incoming information regarding external forces
- Improved neuro muscular connection
- Example: High performance sports

Nervs /

Neuro

Transmitters

- Activation of Spinal reflexes
- „Tuning“ of the Nervous system via mobilisation / sensibilisation
- Increased number of Neurotransmitters

(Dopamine / Serotonin)

- Increase neuromuscular connections
- Example: M. Parkinson

Effects IV

Bones &

Cartilage

- Bones follow the same rules as muscles
 - Speed of deformation strengthens the bones
- Build up of bones
- Example: Osteoporosis
 - Intermittent pressure improves cartilage function
- Increased synovial fluids surrounding cartilage (Improved nutrition)

Skin

- combination muscle, blood circulation, improved lymphatic transport, connective tissue causes a tightening of the skin

Vibration training as a complement

- VT causes mechanical vibrations which are transferred to the body
- VT is a new and modern form of training because of its positive effects on different systems of the body
- Used as warm-up, Strength training, Coordination training, Balance training, Regeneration, Cool-down

- Excellent alternative to all sports

Vibration training in Therapy

- Absolute Contra-indications:
 - > Cardiac pace maker
 - > Pregnancy
 - > Cemented joint implants
- Relative Contra-indications:
 - > Therapist needs to decide whether VT is indicated or not

Vibration training in sports

- Improved coordination (central/peripheral NS)
- Improved learning situation
 - Increased recruitment of muscle fibres (Intramuscular coordination)
- Increased strength
 - Frequency of training: 3 / week
- Eventually combined with strength training (super compensation)
 - Warm-up prior to endurance training
- immediate ideal effects (increased efficiency)

Application area

Medical Area

- physical therapists, rehab clinics

Professional Area

- sports consultants, sports clubs, training centers, golf clubs, tennis clubs

Fitness Area

- fitness studios, wellness hotels

Application fields

Medical application

incontinence, osteoporosis, MS, rehabilitation following injuries, treatment of pain and stiffness

Professional application

effective exercising method for both hobby and serious athletes, stretches, extends and smoothes muscles, increasing explosive strength, strength training

Fitness application

improving coordination and movement ability, eases tension

**Article by:
Dr. Syed Mohammad Waris**

▶ **BPT (RGUHS), MSc. Physical Therapy (USA), MD (ALTER MED), CYT**

MIAP, MIRS, FRHS, AMPLR (UK), MSJA (Malaysia), MWSO (Switzerland).

▶ **Certificate course in biomechanics and kinesiology (London Academy for Sports and Health Science UK)**

▶ **Vibration Therapy training at PROVIB (Austria)**

▶ **Matrix Rhythm therapy Training at Munich Germany**

▶ **Fellowship in Neuro Rehab (London Academy for Sports and Health Science UK) .**

▶ **Mentamove device training at NMC Specialty (ABU DHABI UAE)**

▶ **EX-Rehabilitation In charge at NATIONAL STROKE ASSOCIATION OF MALAYSIA SABAH.**

▶ **Consultant Physiotherapist at NOORA Specialty Hospital Kashmir**

▶ **Personal Physiotherapist to HIS HIGHNESS SHEIKH HAMD BIN HAMOOD AL GHAFREY (SALALAH OMAN)**

▶ **Associate Director at London Academy for Sports and Health Science UK.**

▶ **Email: warishaqani@gmail.com**

▶ **Mobile no: 0096892623804
website:www.wihob.in**

Utilization of Traditional, Complementary and Alternative Treatments among Mentally Ill People in Indonesia: A Qualitative Content Analysis

Imam Waluyo¹, Septian Gandaputra², Muhammad Arsyad Subu³, Sarkosih Sarkosih⁴, Djadjang Aditaruna⁵, Siswo Purwanto⁶

¹Physiotherapy Program University of Binawan Jakarta – Indonesia

²Faculty of Health Sciences Asia University – Taiwan

³Faculty of Health Sciences University of Sharjah – United Arab Emirates

⁴Medical Laboratory Program University of Binawan Jakarta – Indonesia

⁴⁻⁶Physiotherapy Program University of Binawan Jakarta – Indonesia

Corresponding authors:

Imam Waluyo

imamw@binawan-his.ac.id

Abstract

Little information is known regarding the use of traditional, complementary and alternative treatments among mentally ill people, their families and community members in Indonesia. This study is a part of a larger PhD dissertation that explores the use of traditional, complementary and alternative treatments among people with mental illness. A qualitative content analysis method was used. Data collection method involved semi-structured interviews, document review, field notes and memos. Content analysis was employed to organize and manage data. Study identified five themes: (1) the first choice of treatment for mental illness, (2) possessed by demons, Satan, or spirits, (3) sinful illness (illness caused by sin), (4) types of traditional complementary alternative treatments, and (5) violent treatments conducted by traditional healers. Study results indicated that complementary – alternative and traditional treatments and „smart people“ (healers) are the central roles in offering and providing treatments as solutions when people have mental illness in Indonesia. Visiting complementary – alternative and traditional therapists, is the first choice of people (patients, families and other community members) when dealing with treatments of mental health problems. Further research is needed to understand the attitude or perspective of the family, the community and government staff as participants regarding these treatments. More importantly, it is needed to understand the effectiveness of these treatments which is still poorly studied in Indonesia. In addition, quantitative research is needed to examine the factors that affect the utilization of traditional or alternative therapies by 2

Background

Republic of Indonesia is the fourth largest country in terms of population in the world. Total Indonesia population is 259,940,857, with approximately 118 million (52%) living in urban areas (Ministry of Health of Indonesia, 2012). According to the Ministry of Health of Indonesia (2013), the prevalence of severe mental disorders is 1.7 and mild mental disorder is about 60 per 1000 population. According to data from 33 psychiatric hospitals (RSJ) in Indonesia in 2012, the number of people with severe mental disorders reached 2.5 million (Rudi, 2012). By region, the highest prevalence was found in Central Jakarta (22.8%), and the lowest in South Jakarta (10.9%) (Keliat, 2013). The medical treatment of mental disorders in Indonesia is not optimal (Maramis, 2007) and the quality of hospital mental health services is also not ideal (Minas and Diatri, 2008). According to Irmansyah (2010), only about 1% of Indonesia's total healthcare budget is directed towards mental health services, the lowest in Asia, and the country has one of the lowest ratios of psychiatrists per capita in the world. Over half of these psychiatrists work in the capital city of Jakarta (Meshvara, 2002). Healthcare workers lack knowledge and skill in diagnosing mental disorders, and public health facilities for the treatment of mental health problems (public health centers, hospitals, and the practice of general practitioners) are limited (Rudi, 2012). These limited services, coupled with low public awareness of both mental disorders and treatment facilities, make it difficult for community members to access healthcare facilities. Therefore, families tend to bring patients to traditional healers, religious leaders, or to those involved with other types of alternative treatments.

The use of traditional, complementary and alternative treatments in Indonesia began centuries ago, and many mentally ill patients and their families continue to seek treatment from traditional or alternative healers. Those providing alternative and traditional treatments are key persons for people who have mental health problems (Hirokoshi, 1980; Lukens-Bull, 2005; Salan and Maretzki, 1983). However, only limited studies on the benefits of these traditional treatments and religious healers have been undertaken. In Indonesia, mentally ill people are isolated by family or community members because they are believed to have a cursed illness, one that has been brought about by witchcraft (Subu, Holmes, Elliot, & Jacob, 2017). Healthcare professionals are often tolerant of traditional treatments and believe that religious beliefs, spiritual ideas, and modern medicine each play a role (Good and Subandi, 2004). Many Indonesians attribute mental illnesses to the influence of supernatural ancestors or to bewitchment, and they perceive that traditional treatments can help. Some traditional beliefs dictate that good health consists of a harmonious balance between hot and cold substances in the body and or that mental disorders imply a disturbance between the soul and the flesh. In Indonesia, traditional or alternative healers are called smart people. Traditional or alternative Indonesian treatments are divided into four categories: healers who use traditional herbs such as jamu or herbal drinks, food, water, and oil; traditional instruments (coins or glass); traditional methods (massage, acupressure, etc.); and healers who use supernatural powers (energy or aura) (Salan and Maretzki, 1983). There are about 500,000 traditional complementary and alternative healers throughout Indonesia (Ministry of Health of Indonesia, 2013).

Demonic possession – the belief that sufferers of mental illness are possessed by demons, spirits, devils, ghosts, or have had a spell cast upon them by someone (Hawari, 2001) – is common among Indonesian cultures and religions. Traditional or alternative healers, referred to as “smart” people, are thus often the first choice for treatment by patients and their families and community members. Kiyai (Islamic leaders), chaplains, dukuns (shamans), paranormal, and Chinese healers are several types of smart people. People who are suffering from mental illness 3

are also brought to „dukuns“ (shamans) (Hawari, 2001, Subu, 2015). A dukun is an Indonesian term for shaman (Harvey and Wallis, 2007). In Indonesian society, dukuns are traditional healers, spirit mediums, custom and tradition experts, and on occasion, sorcerers and masters of black magic. Indonesian people have always believed in supernatural things such as ghosts, spirits and witchcraft. A dukun is believed to be able to communicate with malevolent and benevolent spirits. In addition, paranormal is also chosen as alternative healers by patients, families and community members. However, only limited studies have focused on examining the results of paranormal practices and no experimental results have gained wide acceptance in the scientific community as valid evidence of the paranormal (Oling-Smee, 2007). The purpose of this qualitative content analysis paper is to explore regarding utilization of traditional, complementary and alternative treatments among mentally ill people in Indonesia.

Materials and Methods

1. Study Design

This paper is a part of a larger grounded theory study of Ph.D. dissertation that has been conducted in Indonesia. qualitative content analysis was used in this qualitative research so that rich and deep information could be obtained from the phenomenon under study (Speziale, Streubert, and Carpenter, 2011). Since qualitative research emphasizes trust, transparency, verifiability, and flexibility, it is considered a good method to develop insight and interpretation in the field of nursing education (Polit and Beck, 2013). According to Bryman and Bell (2011), content analysis is a research method for studying documents and communication artifacts, which might be texts of various formats, pictures, audio or video. Social scientists use content analysis to examine patterns in communication in a replicable and systematic manner. One of the key advantages of using content analysis to analyse social phenomena is its non-invasive nature, in contrast to simulating social experiences or collecting survey answers. In addition, qualitative research emphasizes trust, transparency, verifiability, and flexibility and it is considered a good method to develop insight and interpretation in the field of mental health nursing.

2. Research Setting and Participants

This research was conducted at the largest mental hospital in west Java province in Indonesia. Study participants were selected from both male and female patients, as well as nurses working at least three years in the hospital. For inclusion criteria, only adults who self-identified themselves as Indonesian, had the ability to read and write, were at least 18 years of age or older. In the case of the patients, admitted that they had experienced mental illness and stigma. A total of 30 participants (15 patients and 15 nurses who worked in the hospital) were included in this study. All interviews were conducted at the hospital. For the interviews, environments were selected to provide privacy and quiet to make the participants feel comfortable. Informed consents were provided for all study participants.

3. Data Collection and Analysis Methods

a. Data Collection

Semi structured interviews is the primary method of data collection in this study. Informed consents were completed prior to the start of the interview and it was established that they would take 40-60 minutes. Mute evidences, memos and field notes 4

were also parts of data collection methods. These formed the triangulation of data that served to improve the probability that interpretations of the data will be found credible (Lincoln and Guba, 1985). Mute evidences collected in this study was both hard copy and electronic, including nursing reports and logs, nurse performance ratings, meeting minutes (pre- and postconferences), newsletters, and other materials such as the hospital's motto, vision, mission statements etc. Some advantages of these kinds of documents are that they are relatively inexpensive and a good source of information. Field notes and memos were written during the interviews that provide descriptions of hospital wards settings, nurses, and patient activities. During data collection, memo writing includes the interviewers' thoughts and interpretations about the interview, ideas about the emerging theory, and the research process including questions, gaps, as well as the analytic progress of the research. Memos are essentially a way to document thoughts and create a tangible paper trail that explains the researcher's thinking process throughout the research project. Written accounts provide insight into the meanings, perspectives, practices, and events not obtained in interviews. Field notes are used to record observations and reflections on the data, as part of the reflexive approach to the ongoing analytical process. Field notes allowed to collect information on important nonverbal communication, and to make general observations of participants' sights, sounds, interpretations, and gestures.

b. Data Analysis

In this study, content analysis was used in order to identify and understand the utilization of traditional, complementary and alternative treatments among people with mental disorders and their families. Content analysis is a widely used qualitative research technique (Hsieh and Shannon, 2005). Graneheim & Lundman (2004) indicated that content analysis is an interpretive process that focuses on the subject and background and explores the similarities and differences between and within different parts of the text. During the data analysis, the transcript of the interview was read several times to reach an overall understanding. The parts related to the experiences of stigma encountering were extracted from the interviews and placed in a separate text. All words, sentences, and paragraphs relevant to each other in terms of both content and context were merged and coded. Codes and units of meaning were interpreted in the context of the study and compared in terms of similarities and differences. Finally, abstract subclasses were made based on the semantic line (Graneheim & Lundman (2004). From data analysis, re-thinking about the codes and the subclasses resulted in the extraction of five themes: 1) the first choice of treatment for mental illness, (2) possessed by demons, Satan, or spirits, (3) sinful illness (illness caused by sin), (4) types of traditional complementary alternative treatments, and (5) violent treatments conducted by traditional healers.

4. Ethical Issues

Ethical issues are a central issue in this research. It is important that some critical areas were addressed in this research: (1) informed consent and right to withdraw (2) confidentiality and data protection, and (3), potential harms. Informed consent included providing participants with information about their rights and responsibilities within the research project and documenting the nature of the agreement. The researcher consciously and deliberately attempted to clearly and fully provide the potential participant with 5

information about the research project. The consent form clearly explained the study objectives and stated that participants have the right to accept or refuse to participate. Before this study began, the researcher informed each participant about the research and asked his or her consent to participate. Participants were given information relating to the research purpose, procedures, and the potential psychological discomfort to the study participants was explained. Participants were informed that, at any time, they could withdraw from the study without any prejudice. Prior to each interview, participants were required to read and sign two copies of the consent form and they were given one of the copies. The researcher was responsible for protecting all data gathered within the scope of this project. For that reason, confidentiality is also a principle ethical issue in this study. Confidentiality is commonly viewed as similar to the principle of privacy (Gregory, 2003). Therefore, the information a patient reveals to a researcher is private and there are limits on how and when it can be disclosed to a third party. Participants involved in the study must be assured that their data will be kept anonymous unless they give their full consent otherwise. In other words, what has been discussed or disclosed by participants will not be repeated or shared without their permission. Also, each participant was attributed a random, alpha-numeric code in order to make it impossible for anyone to link a transcription to a particular participant (P1 for patient 1 and N1 for nurse 1). In addition, a responsibility of the researcher is to protect all participants from harm while they are participating in an investigation or as a result of the study. Also, there is an inherent risk to the researcher in carrying out the study, especially relevant to research with participants who have a mental illness. Participants were exposed to risks greater than those encountered in their normal daily life, but the researcher was careful not to embarrass, offend, or frighten any of them. In addition, participants were informed about the length of time it would take to participate and the nurses to contact in the event of an emergency.

Results

The study participants consisted of fifteen patients and fifteen nurses who work in the hospital. The patients were aged 21–52 years. Fifteen nurses participated in this study with an age range of 22 to 43 years and a clinical training experience of 3 to 10 years. After analyzing the data with the participants, five themes emerged: (1) the first choice of treatment for mental illness, (2) possessed by demons, Satans, or spirits, (3) sinful illness (illness caused by sin), (4) types of traditional complementary alternative treatments, and (5) violent treatments conducted by traditional treatments.

1. The first choice of treatments for mental illness

According to the participants, most of the people who suffer from mental illness have been brought first to people who practice what we consider traditional, complementary alternative treatments. Very often, these treatments are the first choice of the patients, family, and the community members.

Most [patients] went everywhere for alternative healers because they assume that they are possessed by demons; they are stressed because of this, because of that. So family members think that [there is] no need to go to a mental hospital. They go to chaplains first, to this place first, everywhere first ... Yes, most, if possible do not go to a mental 6

hospital for treatment. The majority go to the hospital as the last option. Some families say, "I have lost everything" (Nurse 11: P.13)

2. Possessed by demons, satans, or spirits

Some Indonesian cultures and religions still believe that all mental illnesses are caused by "sickness demons, satans, Jins or devils." Many family members deny that their relatives suffer from mental illness, or if they do not deny it, they believe that mental illness is caused by demonic possession. According to one participant, people are still influenced by the past; if a person suffers from mental illness, it is because he is possessed by his grandfather's devils or spirits.

Yes, yes it is true patients and families use alternative therapy or treatment with smart people (complementary alternative healers) because they consider mental illness due to be possessed or affected or demonic possession. Patients are possessed or ruled by the Jinn or spirits and so on... that I know from the patient's information. So mental illness is associated with Satan, Jinn or spirit (Nurse 2: p.10).

3. Sinful Illness (illness caused by sin)

Some study participants indicate that people still believe and assume that mental illness is caused by a sin either conducted by the patients or their families.

..... For the majority, they still assume that mental illnesses are caused by a curse. What is it called? A curse ... sin, behaviour or action in the past ... The patients' past. Could be also their family's past, either their mothers or their fathers [or their] grandmothers or grandfathers' past. It is also heredity ... Sure ... Patients with mental illness are considered destroyers etc. Because of a curse and because they are considered as the sinful people (Nurse 6: p.13-14).

4. Types of traditional complementary alternative treatments

There are several different kinds of complementary alternative and traditional treatments available in society from "smart" people, who include *dukun* or shaman, paranormal, and traditional Chinese medicine. One patient participant insisted he did not believe in shamans but he had no choice but to agree to his parents' wishes that he be treated with one. However, after having treatment with a *dukun*, he stated that he had no positive result.

[...] They brought me to the shamans. All „crazy“ people have to, go to the shamans. Yes, I go to the shamans ... my father too, in order to cure my illness. My father was confused. We went to Bengkulu and stayed at my family's home. At the shaman's, there was a chicken to be sacrificed. Voodoo is like that too. Whatever the shaman asked, we obeyed. But after that, nothing happens. This shaman is from there ... His clothes are all black and he never takes a bath. It is really true. ... There are many kinds of these shamans. Some bring „tuyul“ [a small belief] ... Shamans are poor. They make people rich but their homes are huts. At this shaman, I was chanted over with water. Someone wanted to bewitch me. There was lemonade opened ... It was seen in the lemonade that a friend of mine at my school [wants to put a spell on] me. I don't know how he knows that I have a friend at school who was bad to me. Actually, I didn't believe it but 7

because of my condition [from which] I really want to recover, therefore, I just followed. After going back home from Bengkulu, there was no result. As usual, I am depressed again (Patient 10: p. 23-24).

Traditional Chinese Medicine (TCM) is another popular treatment choice for mental illness. This treatment includes various forms of herbal medicine, acupuncture, massage, and dietary therapy. As one patient participant describes that:

I have been in traditional Chinese [treatment] before too. A Chinese healer was there His name is KKL. I took his Chinese pills ... Yes I was there [at the Chinese alternative] ... Then, this Chinese person did wu wu wu wu wu [shows a method of healing process by blowing air from his mouth] to cast out demons, my negative energy, so that I can spend my money for his treatment. That devil [laughs] ... that devil ... [unclear]. Devil ... puooooooooohhh, goes away [spirit and demon]. When I cry out loudly... [Unclear] the devil goes away, like that (Patient 3: p.9).

In addition, paranormal who provide invocation treatments is a popular choice of alternative treatment for patients and their families, and community members.

..... Furthermore, they [paranormal] are only ordinary people ... At the paranormal; we [sick people] are given invocation treatments. They don't know, they are unconscious ... medicines and invocations. They become blank; many people do really forget. After[unclear], doctors [find it] difficult to treat them. I don't want to have treatment like that (Patient 7: p.6).

5. Violent treatments conducted by traditional treatments

Many mentally ill sufferers experience violence at the hands of these smart people when they seek help from traditional healers. Some of these treatments are thought to release the demons or Satans embedded in their bodies. Many are forced to stop taking any medications they were on and required to ingest those given to them by these healers. Also, a patient participant describes his bathing treatment regimen.

If patients have treatment at the smart people, what I know and I see with patients, is usually they aren't allowed to take medicine ... Yes, they aren't allowed to take medical medicines. In addition, they have more prayer treatment ... such as drinking pure water, zikir or wirid [prayer]; they focus more on these. (N6: p.12-13).

I was there (traditional complementary healer) for one and half months. I was bathed at midnight. [The shaman] wanted to use witchcraft for me. I was bathed at 1 pm. I wasn't asleep. I was whipped..... I was whipped similar to the goat. I was there for one and half months, however I was not healthy, I am not better (P2: p.6).

In addition, another type of mental illness treatment is „*penyek-penyak*“ (a hard massage). It is an inhumane treatment but popular treatment undertaken by traditional healers. This kind of treatment is performed on the entire a patient's body to release or to remove the devil or spirit 8

... I was treated like this ... [participant shows his treatment], my head like this ... Whew... hot ... hot, very hot. Sometimes the shaman is violent and he pounds the table ... bruuuukkkkk, like that ... "Then, the devil in my body was taken out," he said. They think that there is a devil or spirit... Yes, they do. My brothers think that too. I got a lot of these kinds of massages when I was angry. My feet were massaged and all of my body (Patient 3: p.8- 9).

As result of these kinds of treatments, patients indicate that they are afraid of their treatment, especially of the abuse of alternative treatments or traditional medicines. One patient who was brought to a traditional healer had been terrified.

..... it was wrong. In N city [a small county in East Java province], I have been there, only for a three months; but it was fearful. I was in a remote area in Java, it was very dark. I was obligated to meet Mr. MA [a traditional healer] ... I was just in one room alone and I was scared. Mr. MA was an ex-mental illness sufferer too. He said: "It is a crazy illness. This is a psychopath," he said. I wanted to run, escape. I was really afraid to see his axe. I was so stressed, [it was] a strange treatment (Patient 3: p.10-11).

Discussion and Conclusion

This study indicates that complementary alternative and traditional treatments are the first choice of psychiatric patients and their families. Several previous Indonesian studies indicated that many patients who end up in clinics and hospitals have consulted one or several traditional, complementary and alternative treatments or healers (Bahar, Ramli and Hardiman, 1979; Leimena and Thong 1979; Westa, Ratep and Putu, 1981). A study result indicates that 45% of people with mental illness will seek complementary alternative and traditional treatments first for an average of 8.5 years before going to a mental health facility (Keliat et al., 2011). Other similar studies results demonstrated that most psychiatric patients have used alternative healers before going to healthcare facilities for treatment (Hawari, 2001, Subu, 2015). These treatments play a key role in Indonesian healthcare and they are widely sought by Indonesian people to meet their mental health treatment needs (Faizal, 2012).

Some studies findings outside Indonesia have similar results with this currents study. For example, in African continent, Abbo et al. (2009) found that about 60% of Ugandans seeking traditional healing practices had at least one diagnosable current mental illness and the majority had moderate to severe symptoms. Also, traditional healers were the first place where Ethiopians sought treatment for mental illness (Girma and Tesfaye, 2011) and in South Africa, they were keys to patients and families in gaining understanding of the psychological experience and in obtaining access to social support structures (Myers, 2010).

Study findings indicate that many people still believe about demonic possession that mentally ill patients are caused by devils, demons or spirits. Although demonic possession is not a valid psychiatric or medical diagnosis recognized by the DSM-V (APA) or the ICD-11 (WHO, many cultures and religions, including Islam, Christianity, Buddhism, and Hinduism retain some sort of belief in the ability of demons or spirits to take control of a human body. In Islam, for example, it is possible for jinn to possess humans. Some Christians also hold that demonic possession derives from the Devil, i.e. Satan, or other demons. Many still believe that demons really do exist as actual spiritual entities, and that they can adversely affect or invade the lives of individuals. In Christian belief systems, Satan and demons are fallen angels (MacKenzie, 1999). 9

This study has demonstrated that many Indonesians who seek help from traditional healers for their treatment are also treated violently by them. Many times patients are ignored, isolated, or treated with rituals rather than with appropriate medications (WHO, 2001; Subu, Holmes, Elliot, & Jacob, 2017). In addition, many cultures still attribute mental illnesses to spiritual attacks, or as punishment for evil doings or illicit psychoactive substance use, among other things (Audu et al., 2013). Demons are able to „demonically possess“ people without the victim’s knowledge or consent, leaving them morally blameless (Amorth, 1999). Among the native populations in Africa too, many still believe that mental illnesses result from demonic possessions (Okasha, 2002). Study indicates that many mentally ill people and their families also use Traditional Chinese Medicine (TCM) as a treatment option for mental illness. TCM practices in Indonesian society include various forms of herbal medicine, acupuncture, massage, and dietary therapy. However, the effectiveness of Chinese herbal medicine remains poorly researched and documented (Shang et al., 2007). In addition, paranormal is also chosen as traditional, alternative healers by patients, families and community members. However, little recent literature discusses specifically the prevalence of paranormal beliefs or the psychiatric interpretation of subjective paranormal experience (Dein, 2012). Some studies have found that paranormal experiences do not help in treating mental illness (Goulding, 2004) and no experimental results have gained wide acceptance in the scientific community as valid evidence of the paranormal (Oling-Smee, 2007). Since 2003, there have been specific rules made by the MOH of Indonesia governing the practice of traditional medicine including that provided by paranormal and TCM practices in Indonesia. As conclusion, many mentally ill patients, their families and community members in Indonesia continue to seek treatment from traditional, complementary and alternative treatments or healers. Traditional complementary and alternative treatments and „smart people“ (healers) are the first choice if people suffer from mental illness. Those providing alternative and traditional treatments are key persons for people with mental illness (Lukens-Bull, 2005; Subu, 2015). However, only limited studies on the benefits of these traditional treatments and religious healers have been undertaken. Many people still believe that mentally ill patients are possessed by devils, demons or spirits. Study finds that people also use Traditional Chinese Medicine (TCM) and paranormal as treatments option for mental illness. Many of the patients participants interviewed indicated that they were forced by their families and community members into seeking help for their mental illness; they were either taken unwillingly to complementary alternative treatment sites where shamans and other „smart people“ abuse them.

Study Implications

The current study results are relevant for mental health providers who provide care to their mentally ill patients. Also, study findings provide useful material for future research directions with Indonesian people with a mental illness. In addition, these findings provide some useful materials and information to be incorporated into education directed toward enabling current and future providers of mental health services to help people with mental illness in Indonesia. Given the possibility that healthcare students will take care of people experiencing symptoms of mental illness, it is important to include a component on the stigma related to mental illness because of the potential that they will face stigma themselves by the general public, particularly if they find work as mental health provider after they graduate. This kind of education needs to incorporate the politics of care (including institutional functioning and 10

agendas) that directly affect healthcare practice. Healthcare students need to be conscious of patients' potential to affect the provision of healthcare. More studies are needed to look at how family members as participants contribute to perceptions of stigma experienced by their members who have a mental illness. In addition, research needs to be conducted into public attitudes to mental illness as participants in the study.

Finally, it is not possible to generalize these study findings. The use of other mental health settings may produce different important data. In addition, given that the study was limited to just 30 participants, it cannot be inferred that these findings are representative of all those with a mental illness. Data gathered was specific to each of the participant's experiences and is therefore not transferrable to the entire mentally ill population. Findings from this study may not be applicable for all mentally ill people in different populations.

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Mini review report:

Title: Does the overhead squat assessment is needed as a movement screening method in health care practice.

Dr. Senthil Purushothaman, Ph.D.¹,

¹Associate Professor, School of Physiotherapy, Vels Institute of Science, Technology and Advanced Studies (VISTAS), Chennai, India.

Description: Globally, the incidence of musculoskeletal dysfunction and its related movement impairment have been extremely raised in varying population. If this movement impairment is not identified earlier with proper musculoskeletal screening, it will leads to recurrent complaint of musculoskeletal system and thereby muscle fatigue and lesser productivity. There are many movement screening methods which has been practiced in the health sector. But the overhead squat assessment is the simple and time-effective key assessments for an indication of gross movement quality. The National Academy of Sports Medicine (NASM) also prefer to focus on what movement compensation occurs at each joint with possible over-active and under-active muscles that could be contributing to the dysfunction and provides a score ranging from 0-3 (3 = performed with perfect form, 2 = performed with compensation, 1 = performed poorly and 0 = unable to perform the assessment due to pain)¹. Using this numerical rating score for the initial assessment by the researchers can be useful to compare with the re-assessment. Ultimately, NASM's method delves into the possible reasons for such compensations in much greater detail than the Functional Movement Screening. The practicality of using the overhead squat as a screening method would appear to be quite strong, as it challenges the mobility of all key joints in the kinetic chain through a movement pattern so commonly used in health care practice. There is also the time efficiency benefit of using just one screening assessment in comparison to the Functional Movement Screening' seven. Although the literature has not focused on this particularly, the notion of 'saving time' is always an important reality in the field and a thorough Functional Movement Screening protocol is likely to take around 10 minutes per participates. In recent years, the research looking at the overhead squat would appear to be growing. Atkins et al² investigated the presence of bilateral imbalance in 105 elite youth soccer players. It has been previously acknowledged that full flexion of the shoulder joint during the overhead squat pattern will challenge the extensibility of the latissimus dorsi muscle³. Butler et al⁴ undertook a biomechanical analysis of the overhead squat assessment in 28 subjects and interpreting the results with 3D motional analysis shows there was no significant difference between the two technique.

Commentary:

In conclusion, the many research explains a number of areas where the overhead squat may be considered as a method for screening movement quality. Notable differences in Ground reaction forces², joint positions⁴, kinematic interpretation⁵ and muscle activation⁶ have been depicted, suggesting that multiple considerations do exist for this one screening assessment. In future, further studies are needed to utilize the overhead squat assessment as a screening method in varying population, so that the merits and demerits of the overhead squat assessment screening method can be dealt. However, from a practical perspective, not all researchers will have access to expensive force plates, motion analysis systems or electromyography (EMG), and thus, the overhead squat assessment can be viable.

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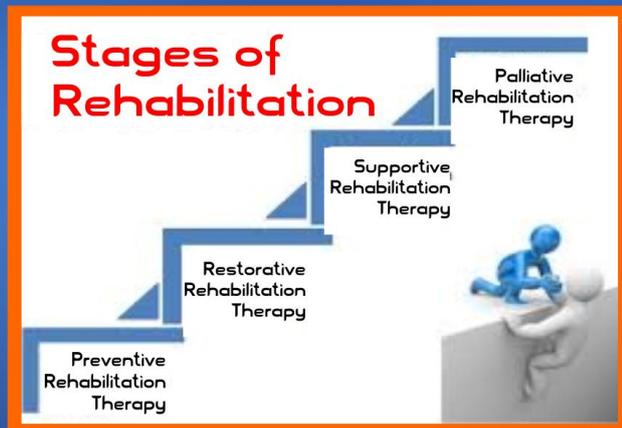
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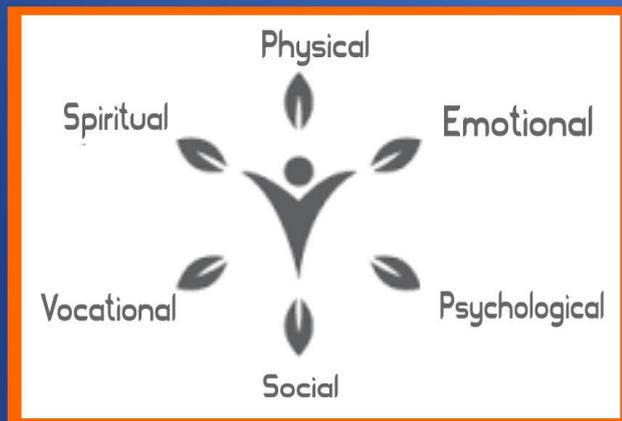
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