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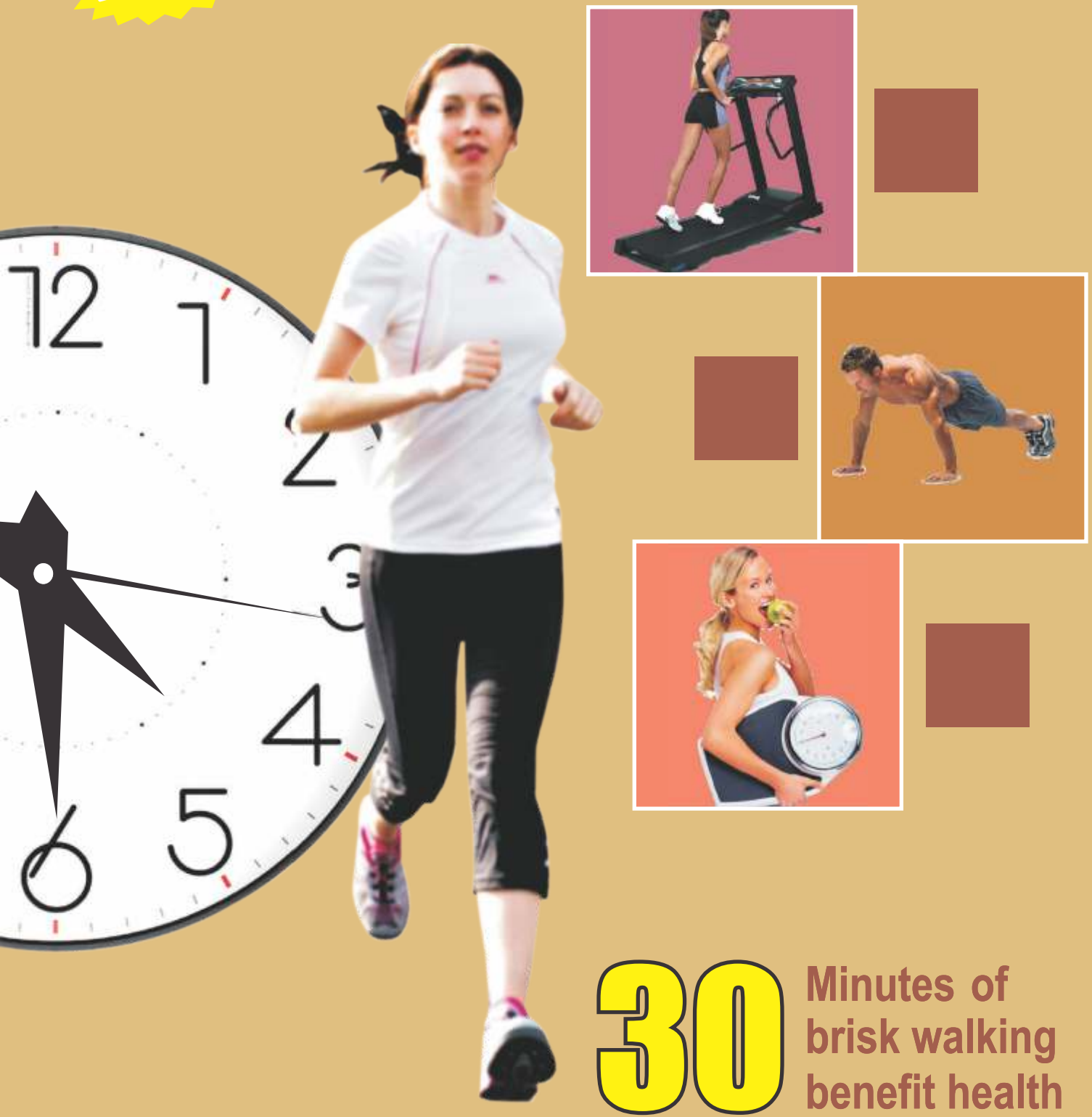
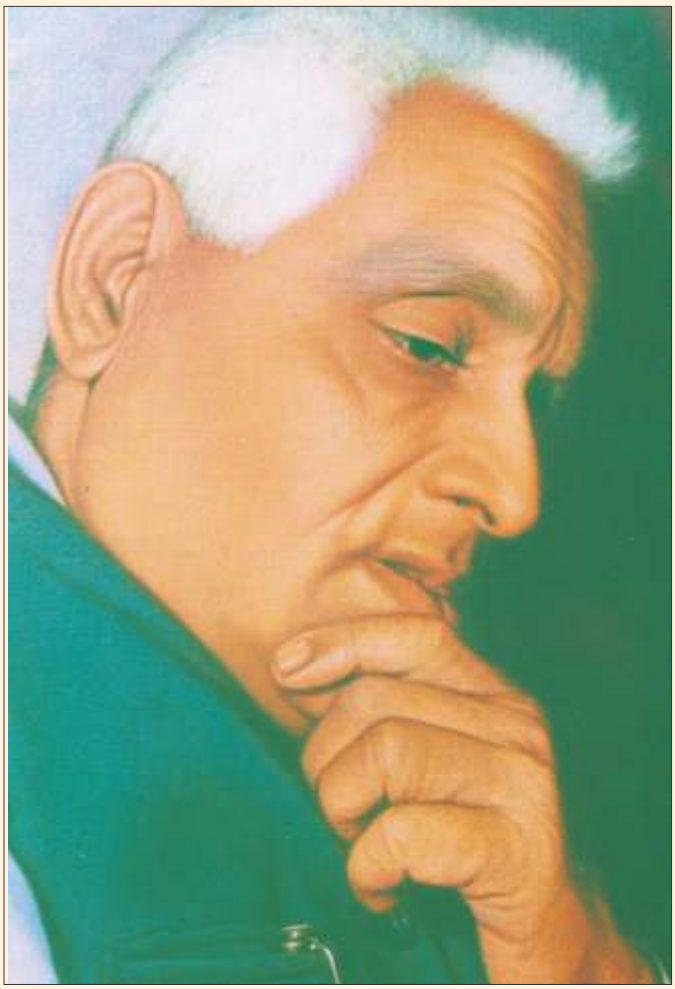


30 Minutes of brisk walking benefit health

Janardan Rai Nagar
Rajasthan Vidyapeeth
(Deemed) 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 Vidyapeeth' 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.

Vice Chancellor's Message

It gives me immense pleasure to learn that the Seventh Volume of Indian Journal of Physical Therapy and Rehabilitation is being published by department of physiotherapy. Sincere effort and keen interest taken by the members of department in the development of academic 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 at the international level.

Wishing all a scintillating success.

Prof. S.S. Sarangdevot
Vice Chancellor

Principal's Message

I have immense pleasure to gather that the Department of Physiotherapy, Janardan Rai Nagar Rajasthan Vidyapeeth (Deemed) University, Udaipur, is going to publish its VIIth Volume of Indian journal of Physical Therapy and Rehabilitation this year.

We must engage in research and voice our opinions by publishing them in this, our local journal. To ensure wide leadership, the journal will carry a variety of articles of general interest, as well as scientific articles, based on topics relevant to our region. Articles in the following categories are welcome: Editorials, Letter to Editor, Major and Minor Reviews, Original Research, Notable Clinical cases, To conference report, New technique I clinical update. With so many categories, I am sure that all of you will be able to make regular contributions to this journal.

This is a major milestone for the physiotherapy field and I encourage all my staff and colleagues in the health care Sec-tor, both public an private, to embrace and support this Journal. The continuing success of this journal should give us a sense of pride and achieve meant. Please contribute articles to this journal in a timely manner to ensure it becomes an important forum for the exchange of ideas and knowledge which will ultimately transfate to better health care.

My Congratulations to the entire team of my Department of Physiotherapy working for this remarkable Endeavour and I wish editor in chief all the best for the successful publication of the journal.

DR. SHAILENDRA MEHTA
Principal
Department of Physiotherapy

The Editor's Desk

It gives me immense pleasure to write editorial for this 7th volume of IJPTR. The Department of Physiotherapy J.R. Nagar Rajasthan Vidyapeeth University Journal with a vision to promote physiotherapy science including all the specialities of Physiotherapy and uptake knowledge through new innovative research papers, case reports and Review articles in various field of physiotherapy specialities. This Journal with consistent precious publications ultimately aims to reach out to the 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 endeavors.

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, 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. S.B. Nagar)
Editor in Chief

Editorial Board

IJPTR an international peer reviewed Journal for all physiotherapist & Rehabilitation professionals with a forum to discuss to days challenges.

INDIAN JOURNAL OF PHYSICAL THERAPY & REHABILITATION

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CONTENTS

FELDENKRAIS METHOD IN CHILDREN WITH AUTISM SPECTRUM DISORDER

Chinmayee Mazumdar* Prasanna Mohan**

Abstract

Children with Autism Spectrum Disorder (ASD) often have difficulties in fundamental motor skills like walking, running, and jumping. In children with ASD, balance is critical which is essential for performing fundamental motor skills and participating in various forms of physical activities and ADL. Due to impairments of balance, the children of ASD may have increased risk of falling during performing various physical activities, experience limited opportunities for learning and face difficulties in engaging in inclusive or community settings. Recent studies revealed many approaches to improve balance; one of the most important of them is the Feldenkrais method of balance training. This study is intended to find out the effectiveness of Feldenkrais method of balance training to improve balance and motor function in children with ASD.

Methods: 30 subjects with age group 6 to 15 years diagnosed with ASD were taken for the study. Experimental group receive Feldenkrais Method of balance training. Treatment duration is thirty to sixty minutes per session for ten weeks. Before and after treatment, the subjects were assessed by Pediatric Balance Scale and GMFM. Statistical analysis was done using Wilcoxon matched pairs test.

Result: Results shown significant improvement of the group in both Pediatric balance scale and GMFM. P value is.0001. Our study indicates that Feldenkrais Method is useful in improving balance and motor function.

Conclusion: The results of our study supports that Feldenkrais Method of balance training is effective in improving balance and motor function in children with ASD.

Key words: Feldenkrais Method, ASD, Balance, Motor function

INTRODUCTION:

The latest version of the Diagnostic and Statistical Manual Disorders. defined Autism Spectrum Disorders as a set of heterogeneous neuro developmental disorders characterized by difficulties in social, communication interaction as well as tendencies towards as a repetitive behavior, acivities, or interests.1 Many of them face difficulties in balance, postural stability, gait, joint flexibility and movement speed compared with peers without ASD.2

The origin of ASD is unknown, different cultural groups have different views on cause of disorder. Western biomedicine considers ASD occur due to significant genetic contribution.3 Also cultural factor also document in contribution in ASD characterization, diagnosis and treatment globally. 4During prenatal or perinatal period of development of the neuropathology of autism begins.5. Although there is no clear etiology for ASD, twin studies shows among identical twins the chances of occurrence ASD in one child increases the chances of others by 35% to 95%.6 Infants who were born prematurely7, were born to older parents8 or who are exposed to prescription medication such as volproic acid and thalidomide during gestation9 having chances of developing ASD.

In ASD impairment of balance and postural control are reported10 and it is the essential requirement in achieveing motor skill for children11. Impairment of balance and postural control may affect on motor development in the children12. Sometimes impairment in balance act as a limiting factor in the child's ability to engaged in various activities at

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home, school and during play.28 Approximately 79% individual with ASD face challenges in performing motor function which decrease activities of daily living.13 Motor deficit in child with ASD occur due to abnormalities in the shape of basal ganglia.14 Due to deficit in motor function reduce involvement of physical activity and sports which ultimately leads to physical inactivity and limited opportunities in community settings.15 According to various forms of standard measures in school age children and preadolescent showed impairment in running speed, and agility, bilateral coordination, manual dexterity and ball skills.16 An impact on schooling, socialization is seen due to motor deficit and it finally contribute to communication deficit.17 In Van Waelvelde et al's18 study, they document the persistent nature of these motor impairments which may persist additional challenges to quality of life.

There is no cure for ASD, with the help of early intervention and appropriate treatment many of them attain some degree of independence, also can work productively.

The efficacy of balance training in children are not properly understand. Many intervention and exercise programs include balance components, only a few research studies focus on balance and motor function in children with Autism Spectrum Disorders.

Method:

This study was carried out at Bubbles centre for Autism and Akshadhya Foundation . Thirty children diagnosed with Autism Spectrum Disorder were taken for the study. 60 subjets are taken for the study by using puposive sampling technique. Exoerimental group received Feldenkrais method of balance training was applied with children with ASD. Duration of the treatment session was two classes per weeks for 10 weeks; thirty to sixty min per seesion. Inclusion criteria of the study were children diagnosed with ASD, age betwwen 6-15 ,subject with moderate to low category with ASD according to CARScale, male and female, ability to follow verbal communication. Exclusion criteri for the study were less than 6 years and more than 15 years, severe category of ASD according to CARScale, significant congenital, musculoskeletal, cardiopulmpnry disoders, visual impairement affecting balance performane, recent injury to lower extremities.

All subjects were assessed on Pediatric Balance Scale and GMFM before and after Feldenkrais Methode of balance training.

Feldenkrias method of balance training:

1.'Turning with the whole body'. Rotation in sitting. The connection between the head and pelvis through the spine is established. It starts to build body awareness of the ribs and pelvis, and starts to improve mobility in the ribs, chest and spine. Confidence in sitting balance is expanded.

2: 'Transferring weight'. Side bending and lateral weight shift, principally in sitting. The relationship between weight shift from side to side and the involvement of the ribs in this movement is established and explored.

3: 'Activating the flexors in sitting'. Forward weight shift in sitting. Exploration of control of the centre of mass over the base of support in the anterior/posterior direction.

4: 'Standing up from a chair, part 1'. This lesson is concerned with a smooth and controlled transition from the stable position of sitting to the less stable position of standing. Sit to stand combined with turning is also explored.

5: 'The feet, the ankles and the ground: waking up your balance sensors'. This lesson is mostly performed in sitting and is about flexibility and movement control of the foot and ankle.

6: 'Standing balance and the pelvis'. Control of the centre of mass over the base of support in standing. Exploration of balance on a static base of support by moving the pelvis in various directions, with various configurations of the feet producing varying degrees of difficulty

7: 'Introduction to walking'. This lesson progresses from the previous lesson - continuing to explore movements of the pelvis over various static bases of support. There is a progression to circular movements of the pelvis over the various foot configurations.

8: 'Standing as balancing'. Progression from the two previous lessons.The emphasis changes from concentrating on the movement of the pelvis to paying attention to the pressure created under the sole of the foot by the various weight shifts.

9: 'Finding your feet'. Continues previous themes but change of focus in this lesson from differentiating pelvic and head movements to holding the trunk rigid through most of the lesson, so that maximal participation from the ankles is achieved.

10: 'Standing up from a chair, part 2'. This lesson is again about sit to stand, with particular focus on the role of the spine, and thoracic extension in particular. There is much practice of moving forwards in space.

11: 'Walking along a line'. Mostly in stride stance, with diagonal weight shift on to a single leg. The practice changes from control of centre of mass over a static base, which has been explored in previous lessons, to control of centre of mass over a changing base.

12: 'Walking on the wall'. Various aspects of weight shift in standing, using the wall as support for the forearms and forehead, with emphasis on mobility in the hips and spine. With the head fixed in space on the wall, differentiation of the head and pelvis is explored.

13: 'The feet in walking'. Exploration of the feet in standing and walking, with a focus on contact of the feet with the ground. The attention is continuously being drawn to tactile sensations from the soles of the foot. The movement theme is altering contact with the ground by walking and standing on the outsides, the insides, the heels and the balls of the feet.

14: 'Dancing with the wall'. Two components: explorations of diagonal connections between the foot through the body to the opposite shoulder, and also ipsilateral coordination between arms and legs on each side.

15: 'Graceful walking'. A lesson mainly spent walking. Arm swing:both proximal (scapula on ribs) and distal (path of the hand through space) elements are explored.

16: 'Driving from the pelvis'. Mainly revision. The focus is on fine control of the pelvis, and the ability to move it over the base of support in both sitting and standing and walking.

Duration of the intervention program is 2 classes per week for 10 weeks and sixty minutes per session.

Result:

A total of 30 subjects was taken for the study. In this study, two groups were compared to know the significant difference between effectiveness of Feldenkrais Method of balance classes. The study measurement are recorded in two time periods, i.e., before and after intervention. Pediatric Balance Scale and GMFM are the parameters used to see the difference between pre value and post value. After collection of data statistical analysis are done through Wilcoxon matched pairs test. Along with the data, presentation is made by descriptive summary and bar graphs.

Groups	Time points	Mean	Std. Dv.	Mean Diff.	SD Diff.	% of change	Z-value	P-value
Intervention group	Pretest	28.13	3.45	-13.97	2.40	-49.64	4.8030	0.0001*
	Posttest	42.10	4.72					

The above table shows comparison of pretest value and posttest value of the interventional group. Pretest mean value is 28.13 and posttest value is 42.10. P-value is 0.0001 which is highly significant.

Graph: Graphical representation of pre and post value in Pediatric Balance Scale

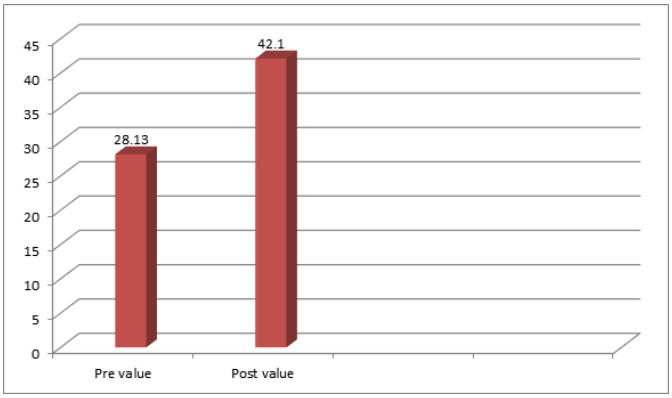
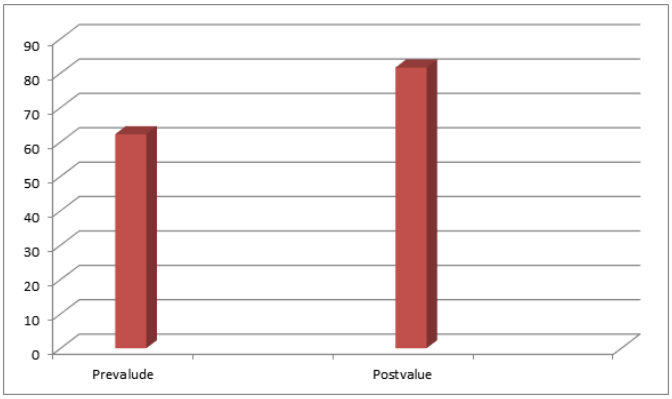


Table 2: Pretest and posttest scores of GMFM (Intervention) by Wilcoxon matched pairs test

Groups	Time points	Mean	Std.Dv.	Mean Diff.	SD Diff.	% of change	Z-value	P-value
Intervention group	Pretest	62.23	2.14	-19.63	2.99	-31.55	4.7921	0.0001*
	Posttest	81.87	1.46					

Comparison of pretest and posttest scores of GMFM by wilcoxon matched paired test. Pretest mean value is 62.23 and posttest mean value is 81.87. P-value is 0.0001 which is highly significant.



Discussion:

Childeren with ASD underwent Feldenkrais Method of balance training are analyze if there exist any significant improvement in balance and motor function. The subjects selected in this study where male and female with Autism Spectrum Disorders with age group 6 to 15 years.

The main aim of the study was to see the improvement of Feldenkrais Method by using PBS and GMFM. When analyzed the results using SPSS version 23, the mean value for pretest and posttest were recorded and fond out that-PBS mean value for Interventional group is 28.13 pretest and post value is 42.10..GMFM mean value for interventional group is 62.23 pretest and posttest value is 81.87. P value is 0.001.This result showed that interventional group, i.e, Group A has improve balance and motor function. This results are similar to study by Jon Tores et al19 who performed randomised clinical trial on to find the effectiveness of Feldenkrais Method improves functioning and body balance in people with intellectual disability and the result suggest that experimental group had significantly improved. This study conclude that Feldenkrais Method is a good tool for improving body balance. Another study by Karol et al20. They investigate effect of Feldenkrais Method of balance and mobility in older adults. After two classes per week for ten weeks showed significant improvement in their ABC score, gait speed and FSST time. This findings suggest that Feldenkrais Method can improve balance and mobility in older adults. Gopal Nambi S21 compared the effects of pilates and Feldenkraise Method of balance training on ambulatory geriatric population. After six weeks of intervention program conclude that improvement in functional balance and quality of life in geriatric population.

Factors contributing to the success of this program were individualized exercises, parental support and support from primary care provider. The Feldenkrais Method based on motor learning principles and and postural control theories. In addition Feldenkrais Method concerned with the concept of moving out with established movement habits.

The result showed that intervention group have shown significant improvement. After intervention in terms of Pediatric Balance Scale and GMFM that indicates Feldenkrais Methode of balance classes are useful in improving balance and motor function.

CONCLUSION AND SUMMARY.

In this study a balance program using Feldenkrais method of balance classes of thirty minutes duration per session for six weeks with two classes per week was carried out which improved balance. These results support the feasibility of conducting further research work in this method. Future research is needed to investigate this hypothesis in a large group of children with ASD.

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Effect of Graded Length Generated Tension in Application of Move Kinetic Tape in Altering Muscle Extensibility

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Abstract

Background. Move Kinetic taping may promote changes in muscle extensibility. These characteristics are purported to be associated with fascial unloading caused by application of Kinesio tape on the skin. However, the most suitable tension generated by tape application for increasing muscle extensibility is still debatable.

Objective. To determine immediate and short term effects of inhibitory taping in individuals using Move Kinetic taping at different tension on hamstring muscle.

Method. Sixty healthy individuals of both genders of age group 17-30 years with no history of pathology or trauma in lower quadrant participated in the study. Subjects were divided into three groups and were made to perform sit and reach test pre and post taping with different graded tension of tape on hamstring muscle.

Result and conclusion. Differences were statistically significant ($p = 0.0002$ and <0.0001 respectively) for Sit-and-Reach test values to the application of Move Kinetic taping (20% and 33% tension) in the hamstring muscle compared to those obtained at 50% tension generated by the tape. The current study showed that the use of Move Kinetic tape at 20% and 33% tension could better improve extensibility.

Keywords: Move Kinetic taping, sit and reach test, hamstring flexibility, inhibitory taping, impediment method

Introduction

Muscular extensibility is an essential component of muscle performance as well as muscle injury prevention and is the ability of muscle to extend, elongating the muscle fibres, increasing the length of the muscle.1 Decreased extensibility is generally observed in biarticular, fast twitch muscles which are subjected to greater stretch predisposing the muscles to strains and overuse injuries.2 It is suggested that deviations from optimal extensibility contribute to muscle imbalances, faulty posture, and dysfunctional movement.3 The amplitude of a muscle is the change in length from its state of full contraction to full stretch but muscles units that cross two joints that have not been trained to employ their full amplitude may fail when required to pass through their full amplitude under rapid and stressful situations leading to varying degrees of muscle damage.4

There are reports in literature showing alteration in muscle extensibility after Kinesio tape application due to continuous tensioning of the skin by the tape, activating skin mechanoreceptors and stimulating the central nervous system modulating mechanisms, thereby increasing muscle extensibility.5,6 This results in varying degrees of muscle damage. Muscle tension has been stated to have a dysfunctional and debilitating effect on neural signalling within myofascial tissue.7 A previous research suggests that Kinesio taping normalizes muscle function.8

Fascia is tough connective tissue which is virtually inseparable from all the structures in the body spreading throughout the body surrounding every muscle, bone, nerve, blood vessel and organ all the way down to the cellular level in the three-dimensional web from head to toe creating continuity amongst tissues to enhance function, stability, dynamic flexibility and support.9 Deep fascia is formed by parallel bundles of collagen fibres which undergo contractions very slowly over a period of 20-30 minutes that may be sustained for more than an

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hour before slowly subsiding; alterations of the deep fascia or alteration in the pressure exerted by the muscles can increase the tensile states of the fascia leading overuse syndromes, traumas or hypomobility lead to myofascial diseases.10,11 Tightening of the fascial system is a histologic, physiologic and bio-mechanic protective mechanism that can lead to poor muscular bio-mechanics, altered structural alignment, and decreased strength, endurance and motor coordination in response to trauma creating fascial restrictions that can crowd, or pull the osseous structures out of proper alignment, resulting in compression of joints, producing pain and/or dysfunction along with entrapment of neural structures causing neurologic symptoms or ischemic conditions.9

Kinetic tape is a relatively new concept of taping developed in 1970s and the intention was to support muscles and joints, aid in range of motion (ROM) and produce benefits to the blood and lymphatic system with other proposed benefits include improved blood and lymphatic circulation, reduced pain intensity, realignment of joints and change in the recruitment activity patterns of the treated muscles.8 Kinesio tape is an elastic, latex-free tape having a wave-like pattern which can be worn for up to 4 -5 days and has approximately the same thickness as the epidermis, consisting of 100% cotton/ synthetic (allowing for faster evaporation of sweat and drying time) and has acrylic, heat-activated glue. It has the ability to stretch 130 - 140% of its original longitudinal static length allowing a greater ROM with the improvement of circulating blood and lymph flow by increasing interstitial space.6 The cotton tape can only be stretched in a particular longitudinal direction, thus energy stored in the tape on stretching is only used in one direction, which decreases the wasting of energy.

Experimental study on chronic non-specific low back pain suggests that use of bandages (Kinesio taping) would inhibit excessive activation in paravertebral muscles , thus subsequently, will improve functionality and would reduce pain intensity.12 Patients with acute whiplash-associated disorders (WADs) receiving an application of Kinesio taping, applied with proper tension, exhibited statistically significant improvements immediately following application of the Kinesio tape and at a 24-hour follow-up.13 Thus, tape tension has a significant bearing on the final results.

Previous researches suggested that Kinesio tape increases mechanoreceptor stimulation and proprioceptive stimulation of taped region, facilitate muscle contraction, and ultimately promote muscle strength and endurance.14,15 Researchers have indicated that prolonged low load stretch is more effective than traditional methods of treatment in producing the desired permanent elongation of connective tissue.7 Also some studies proposed that kinesio tape alters length tension relationship of muscle because when as kinesio tape is applied from insertion to origin it recoils and induces motor neuron inhibition by stretching the Golgi tendon organs.16

A previous study indicated that application of Kinesio tape directly to local muscles around a joint would result in an increase in the range of motion of that specific joint, improve pain, range of motion (ROM), strength, proprioception and muscle activity.17 A study conducted on effects on kinesio taping on lower trunk range of motion reported that Kinesio taping does alter range of motion increasing the ROM and therefore it links to the chain reaction of biomechanical events and flexibility. The application of the tape can alter the desired effects as well. Previous studies observed that the stretch rate and width of the Kinesio tape affected the fascia and flow of lymph fluid which is believed to unload the underlying fascia, thereby reducing pain.8

Kinesio taping has been theorized to affect the deep fascia layers which might decrease susceptibility to microtearing of the tissue as during the process of fascia remodelling, inadequate lengthening (regular stretching) a dysfunctional state with temporary viscoelastic deformations is produced that could increase risk for fascia tearing.18 Kinesio taping may alleviate pain through a reduction in mechanical stress on the tissue (i.e., fascia unloading).8 Fascia unloading is defined as reducing tension in the interconnected fascia layers in response to the mechanical load applied to the tissue during movement and when kinesio taping is applied in a manner that creates convolutions in the skin, which are believed to increase the interstitial spaces between sheets of fascia, thereby reducing stiffness, improving joint range of motion, and decreasing pain.10 Pain relief is believed to be mediated by a reduction in the mechanical load on free nerve endings within the fascia.

Therefore, the purpose of the present research was to analyse the effects of graded tension on hamstring muscle extensibility using inhibitory taping method on healthy individuals over a period of 1day. The author aims to provide precise data concerning the effects of clinical application of Move Kinetic taping.

Methodology

Sixty healthy individuals of both genders of age group between 17-30 years participated. All participants were randomly assigned to either the A, B or C groups. Each group underwent identical treatment protocol during each of the two measurement sessions: baseline pre-intervention and post intervention. Variable testing was done on each participant through three measurement sessions. Each measurement session was completed within 24hours of the last. The two measurement sessions included: baseline pre-intervention and post-intervention. The taping was done with 50%, 20% and 33% tension for each group respectively. During the sessions, the Move Kinetic tape was applied bilaterally to the participant's hamstring muscle according to their randomly assigned treatment group. Subjects undergoing any sort of flexibility training, having pathological disease or trauma in back or lower limbs, allergy or hypersensitivity to Move Kinetic tape application and who cannot perform sit and reach test were excluded. A Move Kinetic tape 5 cm wide was applied to the Hamstring muscle of both legs with the technique in "Y".

For the sit and reach test Yardstick method was used for which requirements included a yardstick, measuring tape, chalk and a recording sheet and pen. The participants were asked to perform a short warm-up prior to this test and include some gentle stretches. The yardstick was placed on the floor and tape placed across it at right angles to the 15-in mark. Having the participant with yardstick between the legs, with legs extended at right angles to the taped line on the floor with shoes removed. The heels of the feet touching near the edge of the taped line about 10 to 12 inch apart 19. Fingertips placed, with hands overlapped and prone, evenly touching the measuring portion, then slowly reaching forward as far as possible. To assist with the best attempt, the participants were asked to exhale and drop the head between the arms when reaching. It was ensured that the knees of the participant stay extended; however, the participant's knees should not be pressed down. The participants were asked to breath normally during the test and should not hold his/her breath at any time. Best of three trials were recorded on a recording sheet.

The requirements for taping protocol were Move Kinetic tape, scissors, measuring tape and a recording sheet. The participants were asked to wear appropriate length shorts, no oils or lotions on their skin, or have excessive hair over the treatment area. A 5 cm wide Move Kinetic tape was taken. Length was measures by asking the participant to lie in prone lying position and measurement was taken from ischial tuberosity to just below the popliteal fossa. Percentage of tension determined as per previous studies20 and tape was cut to length, a cut for Y-strip application was made and the tape was applied with desired stretch from insertion to origin of hamstring muscle. The method of application of tape was based on studies which suggest that when the tape is applied from insertion to origin the eccentric pull on the underlying fascia inhibits the muscle tone,8 thus producing the desired results.

Data analysis

The pre-post test changes were statistically analysed using paired t-test. The pre and post intervention data of all the three groups were compared with the help of one-way ANOVA with post hoc test. The independent variable was treatment option (that is, Move Kinetic tape application). The dependent variables included flexibility for hamstring. Level of statistical significance was set at p ? 0.05.

The above study using paired t-test statistical method between the increment in stretches as on pre-application and post-application length to 1-days post-application reveals that tape tension has significant effect on the flexibility for lower back, hip and hamstring. The results show that with 50% Move Kinetic tape tension the two tailed p-value is more than 0.05 (P=0.1030) with 95% confidence interval(alpha=0.05) whereas, for the same confidence level with stretch of 33% and 20% the resultant p-values are (P value<0.0001) and (P value = 0.0002) respectively, which in turn are less than 0.05. Hence, from the above values as measured, using sit and reach result length, and stated in the report we infer that there is significant effect on flexibility post-application with 20% and 33% stretch (maximum for 33% stretch). However, there was no difference in sit and reach result length using Move Kinetic tape application with 50% tension generated

by the tape.

The statistical significance of the One-way ANOVA shows that the P-value that is the level of significance is .0002. Since, this p-value is below 0.05 (i.e $p<0.05$) we can declare that the result is statistically significant. That is there is a significant difference in the mean productivity between the three different groups of independent variables, graded tension in kinesio tape (50%, 20% and 33%). Also the F-value is 13.1931 which is more than the critical F-value of 3.16 F (2,57). Therefore, the decision is to reject the null hypothesis because the observed F value of 13.1931 is greater than the critical table F value of 6.93.

Discussion

The protocol was supplemented with ideas and beliefs documented in previous studies. Studies of therapeutic value of Kinesio tape have evidence of significant improvement in function, range of motion and reduction of pain. The theory of Kinesio tape being effective in improving function and improve range of motion is supported by previous studies which shows that the fascia elasticity improves with slow and less pressure is more effectively by reducing mechanical tension and pain through fascial unloading. Fascial unloading reduces pain by immobilizing the tissue and also by assembling the soft tissue fibres in alignment with a mechanical tension in the soft tissues. It also reduces stiffness, improves joint range of motion and reduces pain. The effectiveness of application of the tape can be explained by FasioNeuro Modulation. According to which fascia is embedded within the dermis of the body, and the cutaneous nervous system is fastened underneath, which can be used as a switch / grip to stretch, elastic covering with a thick greasy underside sliding around readily. As it slides, the angle and tension on the bilaminar fascia modulates the cutaneous twigs that convey through it are changed stimulating the mechanoreceptors. Combination of fascia stretching with positioning can be used by positioning various parts of the body to add another dimension of mechanoreceptive stimulation to the system being treated.

These results agree with the tape stimulating the skin providing an increase in muscle activity.20 These results are also in agreement with previous work that desired amount of added tension 35% have a greater influence on the muscle tissue.21

Conclusion

Using sit and reach test, the present work is able to distinguish between the percentage stretch to be used and its effect on the flexibility of hamstrings. The results with 33% stretch were found the most optimum among the three stretch percentages considered in this report (50%, 20% and 33%).

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A COMPARATIVE STUDY ON THE EFFECTIVENESS OF TWO MODES OF PLYOMETRIC TRAINING ON LEG MUSCLE STRENGTHENING AND POWER PRODUCTION OF UNIVERSITY BASKETBALL PLAYERS

Nandan Das

BACKGROUND & PURPOSE:

Basketball sports requires the exercise of several components of physical fitness, muscle strength and power. The leg muscles plays vital roles in the successful execution of skills in basketball sports. An important component of a leg muscle strengthening and power production training program for young athletes is plyometric training. Plyometric exercises are those that describe any type of explosive movement being done for a series of repetitions at high speeds and high levels of intensity and consist of a vigorous lengthening of the active extensor muscles (eccentric contraction) immediately followed by a maximal (concentric contraction), which develops explosiveness, the ability to use strength as quickly and forcefully as possible. By bridging the gap between strength and speed, the athlete can optimize power production, and gain strength.

PURPOSE

The purpose of this research was to investigate which is more effective training programs between rebound jumping and squat plyometric in improving leg muscle strengthening and power production.

MATERIALS & METHODOLOGY

The present study which is a 'randomized clinical trial' included 30 male university basketball players of age 20 - 25 years ,having more than 2years of experience in sports of basketball, with regular play of 3 to 5 days per week, and has not undergone any plyometric training. Excluding any recent injuries and surgeries of lower limb. Subjects are divided into two groups.

Group A receives Squat Plyometric and Group B receives Rebound Jumping conducted twice a week for 6 week. Pre and posttest measurements will be taken at the beginning of 1st and end of 6th week. Vertical jump test and Squat test were used for outcome measures.

RESULTS

Unpaired t-test was used to determine the pre- and post-training test score means for vertical jump and squat test between the two groups. Group A was significantly better ($p<0.0001$) after training than Group B in increasing leg muscle strength and hip and thigh power production as measured by "vertical jump test" & "squat test".

CONCLUSION

The squat-plyometric training program can successfully incorporated in a sports specific training program to improve the lower extremity muscle power and strength in basketball players.

KEYWORDS

Basketball, Plyometric.

INTRODUCTION

Basketball is a team of sports in which two teams of five players try to score points by" throwing" or "shooting" a ball through the top of a basketball hoop while following some rules44. Basketball has evolved commonly used techniques of shooting, passing and dribbling as well as specialized player positions, offensive and defensive structures (player positions techniques. the attributes of speed, changes of direction and power rule the same today)14. The leg muscles play vital roles in the successful execution of skills in basketball3,43.

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Basketball jumping is all about explosive power. Muscle power is the ability to exert a maximal force in as short a time as possible, as in accelerating, jumping and throwing implements.

Muscle strength is the ability of a muscle or muscle group to exert force to overcome the most resistance in one effort.

An important component of a leg muscle strengthening and power production training program for basketball players is plyometric training15.

Plyometric or "shock" exercises are those that describe any type of explosive movement being done for a series of repetitions at high speeds and high levels of intensity and consist of a vigorous lengthening of the active extensor muscles (eccentric contraction) immediately followed by a maximal (concentric contraction)45. Plyometric training drills are to develop explosiveness, the ability to use strength as quickly and forcefully as possible. By bridging the gap between strength and speed, the athlete can optimize power production, and gain strength. Plyometric training has shown that it improves power output and increase explosiveness by training the muscles to do more work in a shorter amount of time44. This is accomplished by optimizing the stretch-shortening cycle, which occurs when the active muscle switches from rapid eccentric muscle action (deceleration) to rapid concentric muscle action (acceleration)42.The rapid eccentric movement creates a stretch reflex that produces a more powerful concentric muscle action than could otherwise be generated from a resting position. The faster the muscle is stretched, the greater the force produced, and the more powerful the muscle movement18. Plyometric exercises that exploit the stretch-shortening cycle have been shown to enhance the performance of the concentric phase of movement and increase power output15, 30.

Therefore, in this study we focused on the relative effect of rebound jumping and squat plyometric (squats jumps) on improving leg muscle strength and power production of university basketball players.

PURPOSE

The purpose of this research was to investigate the effectiveness of two training programs rebound jumping and squat plyometric in improving leg muscle strengthening and power production as measured by vertical jump test and squat test and to discover which program optimizes leg muscle strength and power production.

HYPOTHESIS

EXPERIMENTAL HYPOTHESIS: There is significant improvement in lower extremity power and strength following squat plyometric training than rebound jumping training.

NULL HYPOTHESIS: There is no significant improvement in lower extremity power and strength following squat plyometric training than rebound jumping training.

MATERIALS AND METHODOLOGY

STUDY DESIGN:

Randomized clinical trial28, 37

STUDY SETTING:

Meenakshi College of engineering sports department 7

SAMPLE SIZE:

Totally 30 basketball players were selected for this study and they were assigned into two groups. Each group consisting of 15 subjects.25, 31

SAMPLING TECHNIQUE:

The sampling technique used to assign subjects in this study was convenience sampling Technique .38,33

STUDY DURATION:

The duration of the study is 6 weeks21,25

SELECTION CRITERIA

INCLUSION CRITERIA:

- 30 Male subjects25
- Age between 20 to 25 years21,22
- University basketball players25,22
- More than 2 years of experience in the sport of basketball21
- Regular play of 3 to 5 days per week
- Not undergone plyometric or weight training (at least before six month)21

EXCLUSION CRITERIA:

- Recent injuries in lower extremity (fractures, tears, tendonitis)23
- Recent surgeries of lower limb21,25
- Acute sprain or strain in lower limb25,21
- Subjects with history of knee pain.25,21

TOOLS REQUIRED:

- Bench (45cm)1

OUTCOME MEASURES

- Squat test37,23
- Vertical jump test21,38,7,25

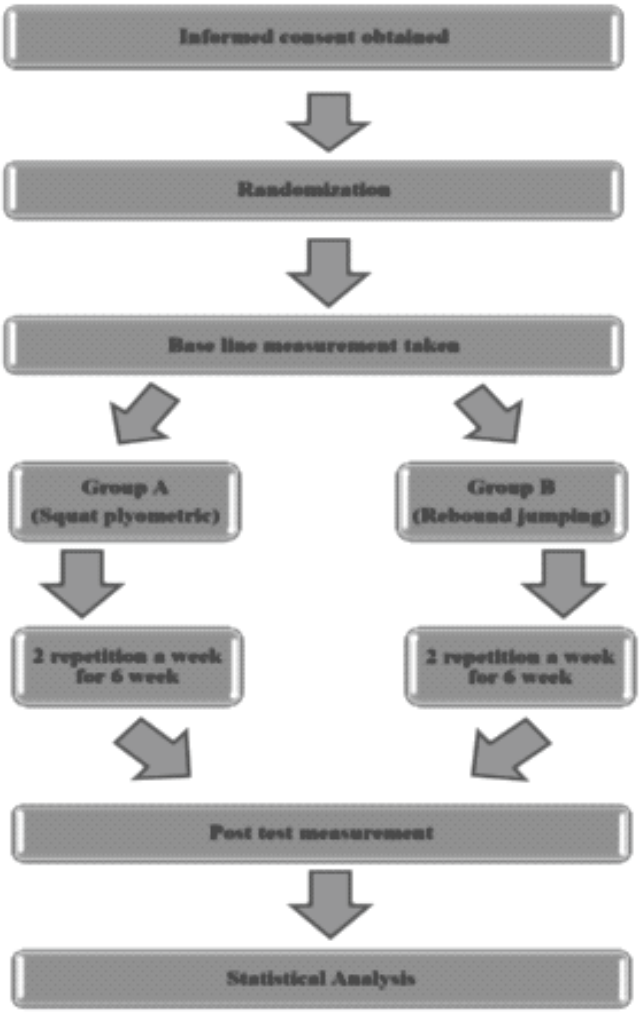
PROCEDURE

Participants in the training program were selected based on the selection criteria. Informed consent obtained from all the subjects. 30 basketball players were selected and allocated in two groups through convenient sampling in group A & group B. Subjects anthropometric data were collected initially and recruited for the study. 'Vertical jump test' and 'squat test' will be done in both the groups as a pre-test and post-test measure.

GROUP A - subjects (n=15) will perform squat plyometric25

GROUP B- subjects (n=15) will perform rebound jumping25

Procedure of the techniques

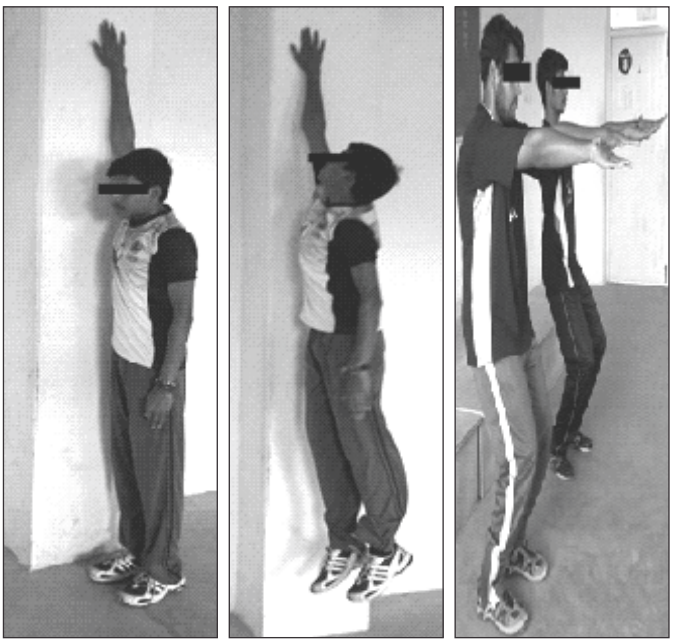


	SQUAT PLYOMETRICS	REBOUND JUMPING
POSITION	**Starting position** – Subjects has to stand with their feet shoulder- width apart, **Action**- squat down, bending the knees and up in the air as high as possible, upon landing they should jump back in the air immediately again. **(figure 4)**	**Starting position** – subjects has to stand on ground, toes close to front edge, feet slightly more than shoulder –width apart **Action-**jump with the two feet leaving the ground at the same time, and rebound after landing from each jump **(figure 3)**
INTENSITY	5x8	5x8
FREQUENCY	2 times a week	2 times a week
DURATION	6 weeks	6 weeks

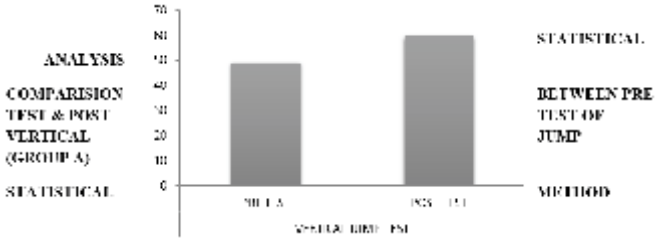
- **Measurement of vertical jump:** Testing procedures included having the subjects standing flat-footed and erect facing a wall while extending the dominant arm. The highest height at maximum effort was used for data collection. The total vertical jump score was calculated in centimeters as the standing height score from the marked wall subtracted from the jumping height score25. **(Figure 1)**
- **Squat test:** Testing procedures included having the subjects standing in front of a chair or bench with their feet at shoulder's width apart, facing away from it, and placing their hands on their hips. They should squat down and lightly touch the chair before standing back up. Noting down how many squats they can do. After they work out for a while, the test is taken again to see how much their lower body strength has improved25. (Figure 2)

FIG 1. VERTICAL JUMP TEST

FIG 2.SQUAT TEST



Pre and post-test measurement will be taken at the beginning of 1st and end of the 6th week.



The collected data was tabulated and analyzed using descriptive statistics - mean and standard deviation was used. To find out significant changes between in both groups, unpaired t-test was used.

Table 1

	MEAN	SD	't' value
PRE TEST	49.00	6.94	4.1197
POST TEST	59.57	6.87	

From the above results it is observed that the mean value of VERTICAL JUMP TEST is found to be increased indicating an increase in VERTICAL JUMP HEIGHT, The p values ($p<0.001$) there is significant improvement in post test because of the squat plyometric training program.

GRAPHICAL REPRESENTATION OF PRE TEST & POST TEST OF VERTICAL JUMP TEST (GROUP A)

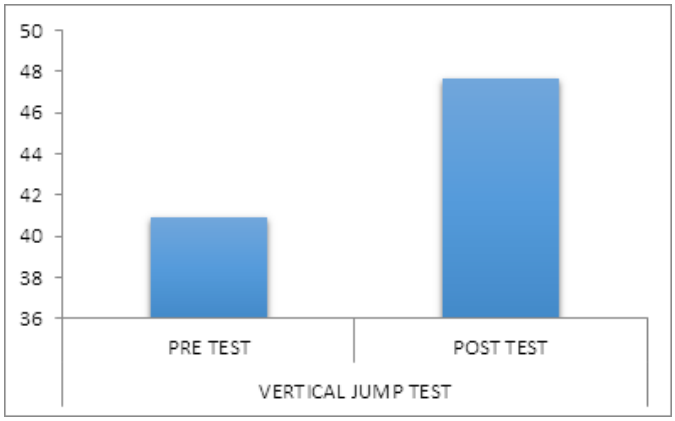


Table 2
COMPARISION BETWEEN PRE TEST & POST TEST OF VERTICAL JUMP (GROUP B)

	MEAN	SD	't' value
PRE TEST	40.93	5.05	3.5973
POST TEST	47.64	4.99	

From the above results it is observed that the mean value of VERTICAL JUMP TEST is found to be increased indicating an increase in VERTICAL JUMP HEIGHT, The p values ($p<0.001$) there is significant improvement in post test because of the squat plyometric training program.

GRAPHICAL REPRESENTATION OF PRE TEST & POST TEST OF VERTICAL JUMP TEST (GROUP B)

Table 3
COMPARISION BETWEEN PRE TEST & POST TEST OF SQUAT TEST (GROUP A)

	MEAN	SD	't' value
PRE TEST	54.00	31.92	1.1377
POST TEST	68.43	36.36	

From the above results it is observed that the mean value of SQUAT TEST is found to be increased, the p values ($p<0.001$) there is significant improvement in post test because of the squat plyometric training program.

GRAPHICAL REPRESENTATION OF PRE TEST & POST TEST OF SQUAT TEST (GROUP A)

Table 4
COMPARISION BETWEEN PRE TEST & POST TEST OF SQUAT TEST (GROUP B)

	MEAN	SD	't' value
PRE TEST	30.20	6.20	3.7481
POST TEST	39.07	6.55	

From the above results it is observed that the mean value of SQUAT TEST is found to be increased, the p values ($p<0.001$) there is significant improvement in post test because of the squat plyometric training program.

GRAPHICAL REPRESENTATION OF PRE TEST & POST TEST OF SQUAT TEST (GROUP B)

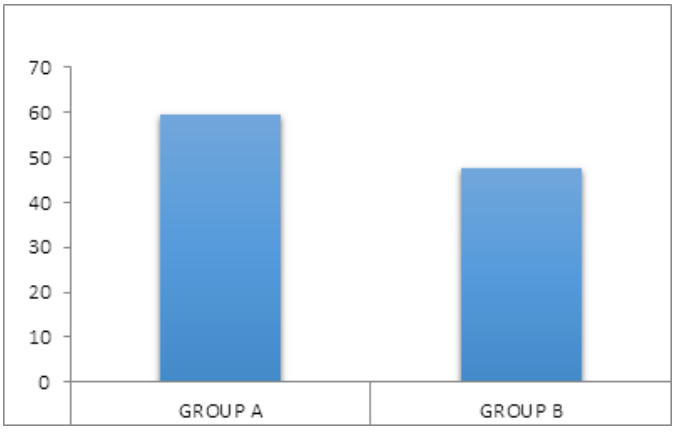


Table 5
COMPARISION BETWEEN GROUP A & GROUP B POST TEST OF VERTICAL JUMP

	MEAN	SD	't' value
GROUP A	59.53	6.62	5.4317
GROUP B	47.64	4.99	

The post test mean for GROUP A is 59.53 and standard deviation is 6.62. The post test mean for GROUP B is 47.64 and standard deviation is 4.99

From the above result it observed that GROUP A post value of VERTICAL JUMP TEST is found to be increased in GROUP A. The p values ($p<0.001$) there is a significant improvement in GROUP A because of SQUAT PLYOMETRIC training program.

GRAPHICAL REPRESENTATION OF POST TEST OF VERTICAL JUMP TEST BETWEEB GROUPA & GROUP B

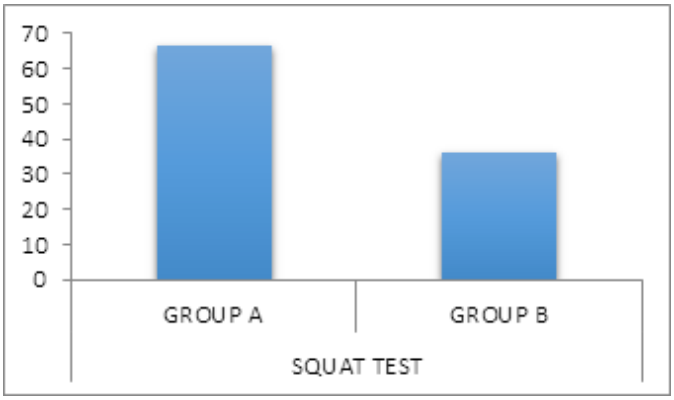


Table 6
COMPARISION BETWEEN GROUP A & GROUP B POST TEST OF SQUAT TEST

	MEAN	SD	't' value
GROUP A	66.40	35.91	2.8011
GROUP B	39.07	6.55	

The post test mean for GROUP A is 66.40 and standard deviation was 35.91. The post test mean for GROUP B is 39.07 and standard deviation is 6.55

From the above result it observed that mean value of SQUAT TEST is found to be increased in GROUP A. The p values ($p<0.001$) there is a significant improvement in GROUP A because of SQUAT PLYOMETRIC training program.

GRAPHICAL REPRESENTATION OF POST TEST OF SQUAT TEST BETWEEB GROUPA & GROUP B

RESULTS

Unpaired t-test21, 39 was used to determine the pre- and post-training test score means for vertical jump and squat test between the two groups. Group A was significantly better ($p<0.0001$) after training than Group B in increasing leg muscle strength and hip and thigh power production as measured by "vertical jump test" & "squat test".

Examination of pre and post training test scores shows that GROUP A increased an average of 11 cm in vertical jump, and GROUP B increased an average of 7 cm Examination of pre and post training test scores shows that GROUP A increased an average of 15 sets more in squat test, and GROUP B increased an average of 10 sets.

Examination of post training of VERTICAL JUMP TEST mean for, GROUP A is 59.57and standard deviation 6.87. The post test mean for GROUP B is 47.64 and standard deviation 4.99, shows that GROUP A (squat plyometric training), there is improvement on leg muscle strength and power in basketball players than GROUP B

Examination of post training of SQUAT TEST mean for, GROUP A is 68.43 and standard deviation 36.36. The post test mean for GROUP B is 39.07 and standard deviation 6.55, shows that GROUP A (squat plyometric training), there is improvement on leg muscle strength and power in basketball players than GROUP B

DISCUSSION

In this study 30 basketball players were selected, divided into two groups and they were tested by using the pre test and post test of vertical jump and squat test, assessed before and after doing plyometric training for 6 weeks.

This study was limited to a six-week, twice per week, micro cycle, and some of the reasons are as follows. From a physiological and psychological standpoint, four to six weeks of high-intensity power training is optimal length of time that the central nervous system can be stressed without excessive strain or fatigue49. It is belief of some sports physiologist that neuromuscular adaptation contributing to explosive power may occur early (within the first two to four weeks) in a power cycle42, 15, 30. Rebound jumping and squat-plyometric were performed only twice per week to allow sufficient recovery time between workout sessions. Training programs should be followed by periods of recovery that mimics specific tasks associated with basketball, known as interval training.

The important contribution of plyometrics to athletic power production can be seen in the following brief mechanical analysis. In the execution of plyometric drills, kinetic energy is generated and stored within the muscles to be used during the subsequent positive phase in the form of mechanical work which improves performance24.When performing plyometrics, the athlete uses the force of gravity to store energy within the muscle structure of the body. This storing of energy is immediately followed by an equal and opposite reaction, using the elastic properties of the muscles to produce a kinetic energy system. Thus by using the myotatic stretch reflex of the muscle to produce an explosive reaction, plyometric is believed to be the link between speed and strength1,. Plyometric training drills are to develop explosiveness, the ability to use strength as quickly and forcefully as possible. By bridging the gap between strength and speed, the athlete can optimize power production, and gain strength17

From the results we have found that there is a significant improvement of the vertical jump after squat plyometric, the p-value of the test is less than 0.01 which shows that there is 99.9% of significance. Previous studies has proven that both rebound jumping plyometric training and squat plyometric training are best in increasing leg muscle strengthening and power production,

so we have taken both best plyometric training from their respective studies and found out which is more better.

Previous studies has indicated that, during a plyometric movement, the muscles undergo a very rapid switch from the eccentric phase to the concentric phase. This stretch shortening cycle decreases the time of the amortization phase that in turn allows for more power production (holcomba, 1996; potteigr, et.al. 1999.)18, 37.the muscle store elastic energy and stretch reflex responses are essentially exploited in this manner, permitting more work to be done by the muscles during the concentric phase of movement (Harman, et.al., 1991; holcomba, 1996) 15

(Ademola Olasupo Abass) compared three plyometric training proramme .Based on the findings of his study, it was concluded that all the three plyometrics training protocols adopted for the study are capable of increasing leg muscle strength, but those with rebound jumping movements increased leg muscle strength significantly.1

(Kent Adams , john p.o) study illustrates that a combined athletic parallel squat and plyometric training program increases hip and thigh power production significantly more, as measured by the vertical jump.27

This study clearly illustrates the close working relationship between neuromuscular efficacy (e.g multiple fiber recruitment and facilitating the stretch reflex) and dynamic strength performance. With reasonable confidence it can be said that parallel squats are conductive to the development of hip and thigh strength, while the simultaneous application of plyometrics permits effective use of this strength to produce explosiveness in sports or events demanding speed and quickness. In other words, the role of plyometrics is to facilitate the neuromuscular system into making more rapid transmission from eccentric to concentric contraction, whereby maximal ballistic force is generated. This lends support to the theories of Gambetta ,o'shea, and yessis and hatfield ,who believe that plyometric training is the link between speed and strength.

LIMITATIONS AND RECOMMENDATIONS

LIMITATIONS

- Only males are selected for this study.
- Sample size was small..
- This study was only done in a minimum duration (6 weeks).
- Follow up not done to study the retention work.

RECOMMENDATIONS

Further studies need to be conducted to prove the efficacy of the procedure and techniques involved in this study with

- This study can be done in longer duration.
- This study can done in other sports players also.
- This study can be done in larger samples.
- Different fields of players and sports.

CONCLUSION

From the above result, it showed the effectiveness of squat plyometric training on leg muscle strength and power production in 15 University Basketball Players. Statistical analysis reveals that there is improvement in squat plyometric training on leg muscle strength and power in basketball players causes changes in physiological adaptation of basketball players. Hence the squat-plyometric training program can successfully incorporated in a sports specific training program to improve the lower extremity muscle power and strength in basketball players. This support the experimental hypothesis.

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A STUDY TO FIND THE EFFECTIVENESS OF MUSCLE ENERGY TECHNIQUE ON PAIN, RANGE OF MOTION AND FUNCTIONALITY IN SUBJECTS WITH CERVICAL RADICULOPATHY

Dolly Borgohain* Sukumar Nayak**

Background and Objectives: The primary goal for every subject is to reduce pain and increase mobility, for better concentration and functionality. Factors causing pain and stiffness of the neck can be due to overuse of muscles, injury, prolong concentration at same position, bad posture while sleeping, etc. Various techniques have been adopted to overcome pain and increase mobility of the neck; Muscle energy technique (MET) is one of them. Various literatures suggest Transcutaneous Electrical Nerve Stimulation (TENS) as an effective treatment for radicular pain when used with exercise. So, this study aims to find the effectiveness of MET to reduce pain, increase range of motion and improve functionality in subjects with cervical radiculopathy.

Methods: Sums of 60 subjects were assigned for this study and were divided into two groups. Experimental group (n=30) was given Muscle Energy Technique with TENS and Controlled group (n=30) was given only TENS. Both female and male subjects of age 45-55 years who were suffering from an acute cervical radiculopathy were taken. Experimental group underwent MET and TENS treatment for 5 sessions per week for 3 weeks. MET was performed by the therapist actively resisting the neck movement with patient generated isometric contraction for 3-5 sec(s) followed by relaxation, which will then be performed in every anatomical position with 3 - 5 repetitions per session for approximately 15 minutes. TENS was given in the painful area for 12 minutes per session. Pre-test values of pain, range of motion and functionality of the neck will be taken for both experimental and controlled group prior to initiation of the treatment and will be re-assessed at the end of 3 weeks. Pain was assessed using Numeric pain rating scale (NPRS), range of motion by universal goniometer and functionality of the cervical spine by Neck Disability Index (NDI). Then statistical analysis was done by using paired t-test and unpaired t-test.

RESULTS: The results showed that Muscle Energy Technique is significantly effective in reducing pain, increasing range of motion and improving functionality in subjects with cervical radiculopathy, ($p< 0.001$). There was significant responsiveness with NPRS, NDI and UG in subjects with cervical radiculopathy.

CONCLUSIONS: The results of this study supports that MET is effective in reducing pain, increasing range of motion and improving functionality in subjects with cervical radiculopathy. When both Group A and Group B were compared, there was no significant difference in NPRS, NDI and UG. However, Group A was found more effective in increasing functionality as compared to Group B. Hence, MET can be used as an intervention in cervical radiculopathy.

KEY WORDS: Cervical radiculopathy, Muscle energy technique, Neck disability index, Numeric Pain Rating Scale, Universal Goniometer.

Introduction: Cervical radiculopathy is a dysfunction and clinical condition of a cervical nerve root resulting in pain and/or sensorimotor deficits due to compression of a cervical nerve root1. Cervical symptoms may include a stiff neck and/or numbness, tingling and weakness in the neck, shoulders and/or arms, as a result of a cervical nerve that has been irritated or pinched by degeneration. Dermatome pain patterns are more frequent at the C4 level (60% of cases) as compared to the C7 (34.2% of cases) and C6 (35% of cases). Scapular pain is found in 51.6% of cases. Level of involvement is most typically C7 (39.3% - 46.3%) and C6 (17.6% - 42.6%) nerve roots3. While sensory symptoms typically present along with a dermatome, pain is often myotomal. According to a study based population by Rochester,

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Minnesota, annual incidence rate of cervical radiculopathy is 107.3 cases per 100,000 men and 63.5 cases per 100,000 women, with a peak between 50-54 years of age7. The pathologic and radiologic evidence of cervical spondylosis in the middle-aged population is more than half. This condition is often is asymptomatic, but in 10% to 15% of the population, it is associated with root or cord compression. Radiculopathy due to cervical spondylosis occur as a result of repeated trauma and usually occurs at the C5 and C7 levels. Prevalence is highest in middle age, with women being affected more than men. The prevalence of neck pain varies widely between studies, with a mean point prevalence of 8%, annual prevalence of 15% to 50%, and mean lifetime prevalence of 49%. Currently, inadequate scientific literature restricts specific conservative management recommendations for cervical radiculopathy. A combination of pain medications such as corticosteroid pain medication and physical therapy may be helpful in treating cervical radiculopathy. If the compression on the nerve roots exceeds to an extent that it affects the motor compartment resulting in weakness, surgery may be necessary to relieve the pressure. Physiotherapy utilizes a number of interventions in the treatment of cervical radiculopathy and muscle energy technique and TENS are one of them. Muscle energy techniques are a form of osteopathic manipulative diagnosis and treatment in which the patient's muscles are actively used on request, from a precisely controlled position, in a specific direction, and against a distinctly executed counterforce. For subjects with acute neck pain, TENS was found to be effective in relieving pain better than electrical stimulation, but not as well as exercise and infrared light, manual therapy, and ultrasound. It is beneficial to obtain patient perceived pain using numeric pain rating scale. This can serve as a subjective measure of pain as a baseline, as well as in response to treatment. While NDI and Universal goniometer helps in evaluating the degree of functionality and range of motion of the neck. There is no research regarding the effect of MET in cervical radiculopathy. So, the purpose of this study is to know whether MET is helpful in relieving pain, and improving range of motion and functionality of the cervical spine. The aim was to check the efficiency of MET in patients with cervical radiculopathy. Objectives were (1) To find the effect of muscle energy technique and transcutaneous electrical nerve stimulation in reducing pain, improving flexibility and functionality of neck in cervical radiculopathy. (2) To find the effect of transcutaneous electrical nerve stimulation in reducing pain, improving flexibility and functionality in cervical radiculopathy.

METHODOLOGY: 60 subjects diagnosed with cervical radiculopathy, was assigned into two groups of experimental and controlled based on inclusion criteria. 30 subjects in each group using convenience sampling method. Written consent was obtained from all subjects prior to the study. Group A (experimental group) received Muscle energy technique with TENS and Group B (controlled group) received TENS alone. Baseline measurements of pain by NPRS, range of motion by Universal Goniometer and functionality by NDI were recorded.

OUTCOME MEASURES: Outcomes of the treatment were measured based on pain scores, functional status and range of motion of the cervical spine. (1). Numeric Pain Rating Scale:

It is a form of subjective measure in which the participants will report the level of pain as perceived by them. It is an 11 point rating scale containing 0 to 10 with 0 indicating 'no pain' and 10 indicating 'the worst imaginable pain'. Participants will select the single number that best represents their pain intensity. (2). Universal Goniometer: It is an instrument which is used to measure the flexion and extension of the cervical spine. The degree of motion will be recorded prior to the treatment and is used again to measure the improvement post-intervention. (3). Neck Disability Index: It is a condition-specific functional status questionnaire designed to help in understanding how the neck pain is affecting the ability to manage everyday - life activity. This questionnaire includes 10 items i.e., pain, personal care, headache, lifting, driving, sleep, work, recreation, concentration and reading. Each item is rated on a 6-point scale (0-5), so the total score in this scale is 50. For example, the pain intensity calculated as 0 for 'no neck pain at the moment' and 5 for 'worst imaginable pain at the moment'. The participants will select the number that best represents their functionality.

STATISTICAL ANALYSIS: In this study, two groups were compared to know the significant

difference between effect of muscle energy technique with TENS (Group A) and TENS alone (Group B) in subjects with cervical radiculopathy. A total number of 60 (n=60) subjects were taken for this study. NPRS, NDI and UG were used to find the effect of treatment in pain, flexibility and functionality. The study measurements are recorded in two time periods, i.e., at the beginning (pre-test) and after 3 weeks (post-test). The data collected were statistically analyzed by using the statistical software namely SPSS 18.0, and R environment ver.3.2.2 and Microsoft word and Excel have been used to generate graphs, tables, etc. Descriptive and inferential statistical analysis has been carried out in the present study. Results on continuous measurements are presented on Mean ? SD (Min-Max) and results on categorical measurements are presented in Number (%). Significance is assessed at 5 % level of significance. The following assumptions on data is made, Assumptions: 1.Dependent variables should be normally distributed, 2.Samples drawn from the population should be random, Cases of the samples should be independent. Student t-test (two tailed, independent) has been used to find the significance of study parameters on continuous scale between two groups (Inter group analysis) on metric parameters. Leven`s test for homogeneity of variance has been performed to assess the homogeneity of variance. Student t-test (two tailed, dependent) has been used to find the significance of study parameters on continuous scale within each group.

RESULTS

Table 1: Distribution of samples into two study groups by GENDER

Gender	Group A (Interventional/Experimental)	Group B (Control)	Total
Female	16(53.3%)	15(50%)	31(51.7%)
Male	14(46.7%)	15(50%)	29(48.3%)
Total	30(100%)	30(100%)	60(100%)

The above table shows the gender distribution of subjects with percentages in Group A and Group B. The total samples being 60 is equally divided into two groups. In Group A out of 30 subjects, 16 (53.3%) are females and 14 (46.7%) are males. In Group B out of 30 subjects, 15 (50%) are females and 15 (50%) are males.

Table 2: Distribution of samples in two study groups by AGE

Age in years	Intervention (Group A)	Control (Group B)	Total
45-50	19(63.3%)	17(56.7%)	36(60%)
51-55	11(36.7%)	13(43.3%)	24(40%)
Total	30(100%)	30(100%)	60(100%)
Mean ± SD	49.53±3.20	50.03±3.35	49.78±3.26

Samples are age matched with P = 0.557, Student t-test

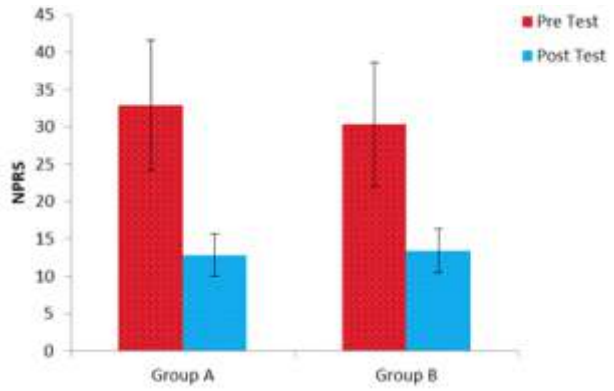
The above table shows distribution of subjects in Group A and Group B according to age. In Group A, 19 subjects (63.3%) are between 45-50 years of age and 11 subjects (35.7%) are between 51-55 years of age. In Group B, 17 subjects (56.7%) are between 45-50 years of age and 13 subjects (43.3%) are between 51-55 years of age. In Group A, the mean age is 49.53 and standard deviation is 3.20. In Group B, the mean age is 50.03 and standard deviation is 3.35

Table 3 : Numeric Pain Rating Scale (NPRS) comparison of two groups using Pre-test and Post-test scores

NPRS	Group A	Group B	Total	P value
Pre Test	32.90±8.72	30.33±8.27	31.62±8.52	0.247
Post Test	12.80±2.85	13.40±2.94	13.10±2.89	0.425
difference	20.100	16.933	18.517	-
P value	<0.001**	<0.001**	<0.001**	-

Between group - Student t-test (Two tailed, Independent)
Within Group - Student t-test (Two tailed, Dependent)

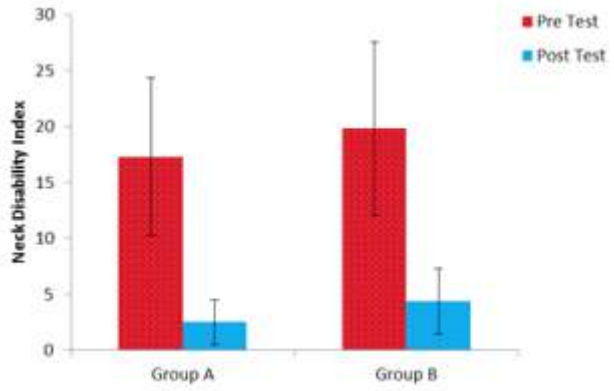
The above table shows the comparison of pre and post test NPRS scores in both groups by between group student t-test (Two-tailed, Independent) and within group student t-test (Two-tailed, Dependent). Within group student t-test in Group A shows p value is <0.001, which is highly significant and in Group B shows p value is <0.001, which is highly significant. Between group student t-test in Group A and Group B post-treatment shows p value is 0.425.



The above graph shows changes in mean NPRS scores with respect to pre and post NPRS values. In Group A pre NPRS mean value is 32.90 and post NPRS mean value is 12.80. In Group B pre NPRS mean value is 30.33 and post NPRS mean value is 13.40

Table 4 : Neck Disability Index (NDI) comparison of two groups using Pre-test and Post-test Scores

Neck Disability Index	Group A	Group B	Total	P value
Pre Test	17.30±7.06	19.83±7.76	18.57±7.47	0.191
Post Test	2.53±2.01	4.37±2.91	3.45±2.65	0.006**
difference	14.767	15.467	15.117	-
P value	<0.001**	<0.001**	<0.001**	-

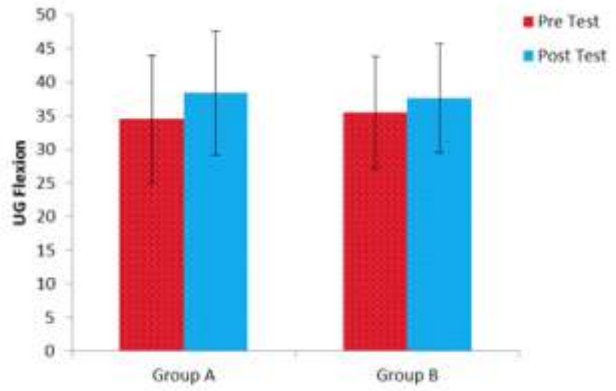


The above graph shows changes in mean NDI scores with respect to pre and post NDI values. In Group A, the pre NDI mean value is 17.30 and post NDI mean value is 2.53. In Group B, the pre NDI mean value is 19.83 and post NDI mean value is 4.37.

Table 5 : Universal Goniometer (UG) comparison of two groups using pre-test and post-test scores for CERVICAL FLEXION

UG for Flexion	Group A	Group B	Total	P value
Pre Test	34.47±9.45	35.47±8.29	34.97±8.82	0.665
Post Test	38.33±9.22	37.60±8.09	37.97±8.61	0.744
difference	-3.867	-2.133	-3.000	-
P value	<0.001**	<0.001**	<0.001**	-

The above table shows the comparison of pre and post test UG scores for cervical flexion in both groups by between group student t-test (Two tailed, Independent) and within group student t-test (Two tailed, Dependent). Within group student t-test in Group A shows p-value is <0.001, which is highly significant and Group B shows p-value is <0.001, which is highly significant. Between group student t-test in Group A and Group B post-test shows p-value is 0.744, which indicates no significant difference.

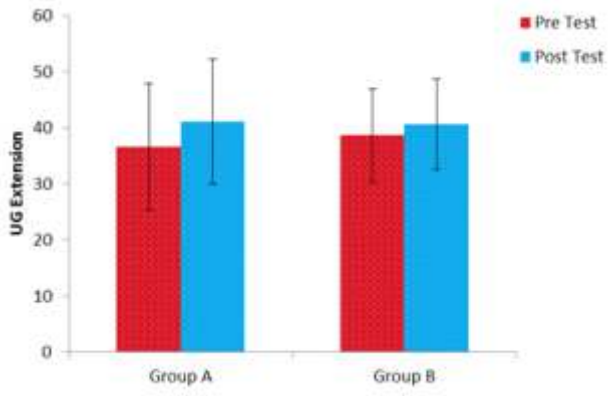


The above graph shows changes in mean Universal Goniometer (UG) scores with respect to pre and post UG for flexion values. In Group A, pre UG mean value is 34.47 and post UG mean value is 38.33. In Group B, pre UG mean value is 35.47 and post UG mean value is 37.60

Table 6 : Universal Goniometer (UG) comparison of two groups using pre-test and post-test scores for CERVICAL EXTENSION

UG for Extension	Group A	Group B	Total	P value
Pre Test	36.67±11.24	38.63±8.36	37.65±9.87	0.445
Post Test	41.17±11.14	40.70±8.09	40.93±9.65	0.853
Difference	-4.500	-2.067	-3.283	-
P value	<0.001**	<0.001**	<0.001**	-

The above table shows the comparison of pre and post test UG scores for extension in both groups by between group student t-test (Two tailed, Independent) and within group student t-test (Two tailed, Dependent). Within group student t-test in Group A shows p-value is <0.001, which is highly significant and in Group B shows p-value is <0.001, which is strongly significant. Between group student t-test in Group A and Group B post-test shows p-value is 0.853, which mean there is no significant difference.



The above graph shows changes in mean UG for cervical extension scores with respect to pre and post UG values. In Group A, pre UG mean value is 36.67 and post UG mean value is 41.17. In Group B, pre UG mean value is 38.63 and post UG mean value is 40.70

Discussion: Cervical radiculopathy may have many etiologies, among which the most common cause is disc herniation and cervical spondylosis. The majority of subjects with single nerve root involvement are found to improve with non-surgical treatment, but no precise treatment has been developed by controlled studies to resolve the disorder. This study was performed to determine the effectiveness of Muscle Energy Technique to improve functionality and flexibility of cervical spine and decrease pain in subjects with cervical radiculopathy. The subjects were divided into two groups- Group A (interventional) and Group B (controlled). The subjects in Group A were treated with MET and TENS and the subjects in Group B were treated with TENS alone. After careful intervention and analysis, both Group A and Group B were found equally effective in treating cervical radiculopathy, but Group A was more effective than Group B in improving functionality.

CONCLUSION This study concludes that MET is effective in decreasing pain, improving range of motion and functionality in subjects with cervical radiculopathy, furthermore it can be said that the use of MET in cervical radiculopathy is beneficial. Hence, alternate hypothesis is accepted with p = 0.00 and null hypothesis is rejected. Subjects in Group A, MET and TENS, and Group B, TENS alone, were found equally effective in reducing pain by Numeric Pain Rating Scale and increasing range of motion by Universal Goniometer. Group A confirmed to have strongly significant effect in improving cervical functionality by Neck Disability Index as compared to Group B.This study showed a positive effect of MET in subjects with cervical radiculopathy. Before intervention all subjects exhibited cervical radiculopathy with increased pain, decreased range of motion and decreased functionality in daily activities, after intervention of MET all subjects showed decrease in pain, improvement in range of motion and increased functionality

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"A STUDY TO CHECK EFFECTIVENESS OF KINESIOTHERAPY AND ELECTROTHERMOTHERAPY IN TREATMENT OF PATIENTS WITH KNEE OSTEOARTHRITIS: A COMPARATIVE STUDY"

Nidhi Sharma

ABSTRACT

BACKGROUND:

Although recent advances in knee osteoarthritis (OA) treatment and evaluation were achieved, to the best of our knowledge, few studies have evaluated the longitudinal effect of therapeutic modalities on the pain and functional exercise capacity of patients with knee OA. The purpose was to investigate the comparative effects of Kinesiotherapy and Electro thermotherapy in patients with bilateral knee OA. Measurements included range of motion (ROM), severity of knee pain (VAS), and a measure of perceived health and physical function, evaluated using the Western Ontario and McMaster Universities (WOMAC) Osteoarthritis Index.

AIMS AND OBJECTIVES:

To compare the effectiveness of Kinesiotherapy and Electrothermotherapy in reducing pain, increasing flexion range of motion(ROM) and functional performance in patients with knee osteoarthritis.

METHODOLOGY:

Thirty Osteoarthritis patients were randomly selected according to inclusion and exclusion criteria and were divided into two groups - Group I and Group II. Both the groups assessed for the pain using Visual Analogue Scale, Knee flexion range using Goniometry and physical function using WOMAC. These parameters were assessed before starting of programme as pre-test value and the end of every 2nd week. Total duration of treatment was 3 months. Group I received exercises (Kinesiotherapy) and group II received cryotherapy, US and TENS (electrothermotherapy).

RESULT:

The mean age of Group I was 61.47 and Group II was 60.20 years. For Knee flexion Right the mean difference was 6.133 and 't' score was 5.070 which is significant ($P<0.01$) and for knee flexion (ROM Degrees) Left The mean difference was 5.000 and 't' score was 3.268 which is significant ($P<0.01$). Knee VAS Scores Right The mean difference was 2.933 and 't' score was 7.192 which is significant ($P<0.01$) and VAS Scores Left The mean difference was found to be 2.933 and 't' score was 7.192 which is significant ($P<0.01$). For WOMAC Scores The mean difference was 7.267 and 't' score was 4.086 which is significant ($P<0.01$).

CONCLUSION:

Result of study states that Kinesiotherapy is better than Electrothermo therapy in improving flexion range and physical function, though it too reduces pain but eletro thermotherapy is better mode of choice in pain reduction. So, it can be concluded that electrothermotherapy can be used as adjunct to kinesiotherapy in treatment of patient with knee osteoarthritis.

KEY WORDS: Pain, ROM, VAS, WOMAC, Knee Osteoarthritis, Kinesiotherapy, Electrothermotherapy.

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INTRODUCTION

Osteoarthritis (OA) is a degenerative joint disease, commonly known to be wear and tear of joints, marked by degeneration of the articular cartilage, hypertrophy of bone at the margins, and changes in the synovial membrane.1 It is a dynamic disease, reflecting the relationship between breakdown of tissue and its subsequent restoration. When cartilage softens and breaks down, the underlying bone becomes exposed. This results in bone breakdown, followed subsequently by new bony formation. The new bone, however, is often in the form of prominent osteophytes, which rub together, causing pain and limited motion. OA is one of the most common forms of arthritis and affects men and women equally. For many adults OA is one of the most important causes of long-term disability. Osteoarthritis can affect any joint but usually affects the hips and knees, hands and spine. The knee appears to be the joint most prone to the development of OA. This may be because it is a major weight-bearing joint, and prone to effects of obesity, trauma, as well as some metabolic diseases.

Osteoarthritis is the second most common rheumatologic problem with a prevalence of 22% to 39% in India.[2,3] OA is more common in women than men, but the prevalence increases dramatically with age.[2,3,5]

NEED OF THE STUDY

Recent studies states that Electrothermotherapy has significant effects in relieving pain, improving range of motion and functional performance in knee osteoarthritis. Study indicates that exercise should be a core treatment in the management of osteoarthritis, irrespective of age, co morbidity, pain severity or disability. Therefore, study is to compare the effectiveness of Kinesiotherapy and Electrother motherapy in OA patients.

OBJECTIVE OF THE STUDY

To determine which of the two techniques is more efficient in reducing pain, increasing range of motion(ROM) and physical performance.

HYPOTHESIS

EXPERIMENTAL HYPOTHESIS

There will be significant difference in pain, knee flexion range of motion and function with application of kinesiotherapy and electrothermotherapy in management of OA knee.

NULL HYPOTHESIS

There will not be significant difference in pain, knee flexion range of motion and physical function with application of kinesiotherapy and electro thermotherapy in management of OA knee.

METHODOLOGY

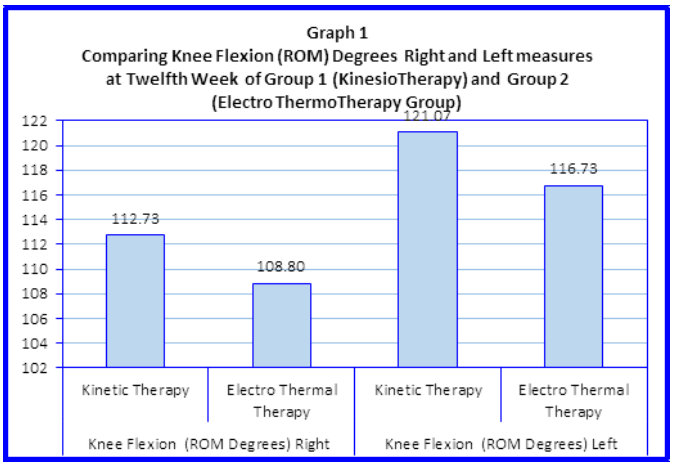
Study Design : Comparative study **Source Of Data :** Pacific Center of Neurosciences Sample Size : 30 Individuals Duration Of The Study : 12 weeks Sample Selection : 30 Patients were randomly selected according to inclusion and exclusion criteria and divided into two groups - Group 1 : Kinesiotherapy group and Group 2 Electro - thermotherapy group. Inclusion criteria: Subjects with bilateral symptomatic OA knee diagnosed by Orthopaedician, Both male and female, Subjects with age groups 50-70 years, Radiographic confirmation of knee OA. Exclusion criteria: Subjects with unilateral OA knee,Surgical procedures within last 6 months,Rheumatoid arthritis, Hypersensitivity with ice,Subjects with poor thermal regulation , Patient with cognitive impairment, Locomotion by wheel chair and knee prosthesis

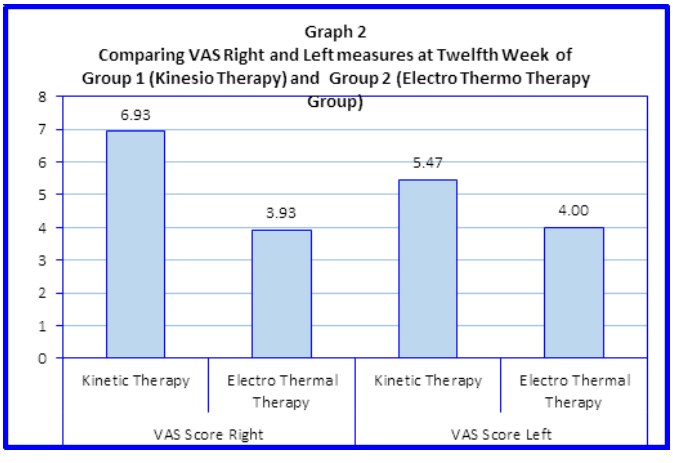
INTERVENTION :

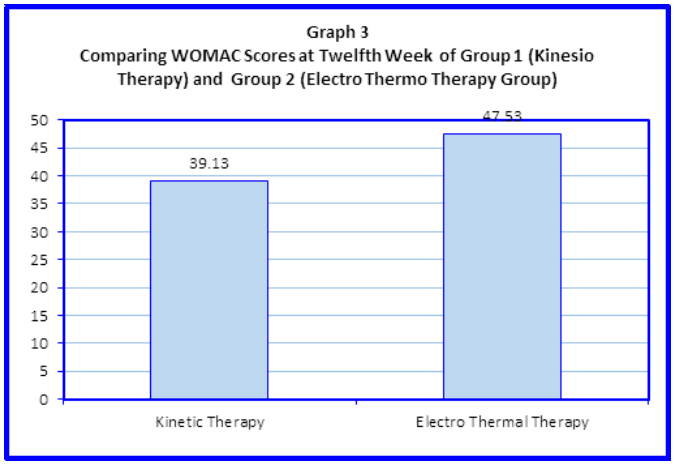
On the first day of treatment, the individual were assessed for range of motion of both knee joints by goniometer, pain by VAS scale and physical function by WOMAC. GROUP 1 : receieved only exercise. Treatment Parameters - Passive Stretching of Hamstring, Tensor fasia lata, Gastrocnemius and soleus muscles.(Duration of hold of stretch - 30seconds, Repetition - 3 times per session Frequency - 3 sessions per week), Patellar Mobilizations, Isometric Exercises (Quadriceps, Hamstring and Adductors), Osteokinematic Movements (Hip flexors, Quadriceps, Gluteus maximus, Gluteus medius and knee flexors) (repetition 12-15, sets 3), Arthrokinematic movement (Traction). Treatment session were conducted 3 times per week. Criteria of progression: Progression was done depending upon patient's performance. Adverse ign and symptoms like increased pain, increased skin temperature over knee was examined after every exercise session. If these lasted more than few hours then the intensity of the treatment regimen was reduced. The number of exercise repetition and resistance was increased according to patient's tolerance. Group 2 : Cryotherapy, Ultrasound therapy and TENS were

given. Cryotherapy - duration was 20min. For each joint, US- US mode - Continuous, Intensity - 0.8W/cm2 , Frequency - 1MHz., Duration - 5mins. for each knee. TENS :2 channel TENS, Mode - Acupuncture TENS, Pulse width - 150Us, Frequency - 4Hz, Duration - 20mins.

Measures	Groups	Mean	N	Std. Deviation	Std. Error Mean	Mean Diff	't'	P value
Knee Flexion (ROM Degrees) Right	Kinesio Therapy	112.73	15	5.161	1.333	3.933	1.876	0.071
	Electro Thermo Therapy	108.80	15	6.270	1.619			
Knee Flexion (ROM Degrees) Left	Kinesio Therapy	121.07	15	2.890	0.746	4.333	2.640	0.013
	Electro Thermo Therapy	116.73	15	5.663	1.462			
VAS Score Right	Kinesio Therapy	6.93	15	0.704	0.182	3.000	11.675	0.000
	Electro Thermo Therapy	3.93	15	0.704	0.182			
VAS Score Left	Kinesio Therapy	5.47	15	0.640	0.165	1.467	5.735	0.000
	Electro Thermo Therapy	4.00	15	0.756	0.195			
WOMAC	Kinesio Therapy	39.13	15	5.951	1.536	8.400	4.050	0.000
	Electro Thermo Therapy	47.53	15	5.397	1.393			







Comparing Therapy Effectivity

The effectivity of therapy is analyzed through finding the difference between pre testing and twelfth week, thereafter the difference between both the groups were compared through independent 't' test.

Table 2

Comparing the difference (Pre test and Twelfth week) scores for Kinesio Therapy and Electro Thermal Therapy

Measures	Groups	Mean	N	Std. Deviation	Std. Error Mean	Mean Diff	't'	P value
Knee Flexion (ROM Degrees) Right	Kinesio Therapy	7.93	15	3.035	0.784	6.133	5.070	0.000
	Electro Thermo Therapy	1.80	15	3.570	0.922			
Knee Flexion (ROM Degrees) Left	Kinesio Therapy	6.87	15	4.794	1.238	5.000	3.268	0.003
	Electro Thermo Therapy	1.87	15	3.482	0.899			
VAS Score Right	Kinesio Therapy	0.67	15	0.816	0.211	2.933	7.192	0.000
	Electro Thermo Therapy	3.60	15	1.352	0.349			
VAS Score Left	Kinesio Therapy	0.13	15	0.834	0.215	2.200	6.368	0.000
	Electro Thermo Therapy	2.33	15	1.047	0.270			
WOMAC	Kinesio Therapy	15.33	15	5.948	1.536	7.267	4.086	0.000
	Electro Thermo Therapy	8.07	15	3.474	0.897			

The above table reflects that mean difference scores (Pre testing and twelfth week) for knee flexion (ROM Degrees) Right of Group 1 (Kinesio therapy group) was found to be 1.80 while for Electro thermo Therapy (Group 2) it was 7.93. The mean difference was found to be 6.133 and 't' score was found 5.070 which is significant (P<0.01). It infers that there is significant difference between effect of both

therapies in improvement of Right Knee Flexion. The mean difference (Pre testing and twelfth week) scores suggests that Kinetic Therapy is significantly better in improving Right knee flexion in comparison to Electro Thermal Therapy.

The above table reflects that mean difference scores (Pre testing and twelfth week) for knee flexion (ROM Degrees) Left of Group 1 (Kinesio therapy group) was found to be 1.87 while for Electro thermo Therapy (Group 2) it was 6.87. The mean difference was found to be 5.000 and 't' score was found 3.268 which is significant (P<0.01). It infers that there is significant difference between effect of both therapies in improvement of Left Knee Flexion. The mean difference (Pre testing and twelfth week) scores suggests that Kinetic Therapy is significantly better in improving Left knee Flexion in comparison to Electro Thermal Therapy.

The above table reflects that mean difference scores (Pre testing and twelfth week) for VAS Scores Right of Group 1 (Kinesio therapy group) was found to be 3.60 while for Electro thermo Therapy (Group 2) it was 0.67. The mean difference was found to be 2.933 and 't' score was found 7.192 which is significant (P<0.01). It infers that there is significant difference between effect of both therapies in improvement of VAS Scores Right. The mean difference (Pre testing and twelfth week) scores suggests that Electro Thermal Therapy is significantly better in improving VAS Scores Right in comparison to Kinetic Therapy.

The above table reflects that mean difference scores (Pre testing and twelfth week) for VAS Scores Left of Group 1 (Kinesio therapy group) was found to be 3.60 while for Electro thermo Therapy (Group 2) it was 0.67. The mean difference was found to be 2.933 and 't' score was found 7.192 which is significant (P<0.01). It infers that there is significant difference between effect of both therapies in improvement of VAS Scores Left. The mean difference (Pre testing and twelfth week) scores suggests that Electro Thermo Therapy is significantly better in improving VAS Scores Left in comparison to Kinesio Therapy.

The above table reflects that mean difference scores (Pre testing and twelfth week) for WOMAC Scores of Group 1 (Kinesiotherapy group) was found to be 8.07 while for Electro thermo Therapy (Group 2) it was 15.33. The mean difference was found to be 7.267 and 't' score was found 4.086 which is significant (P<0.01). It infers that there is significant difference between effect of both therapies in improvement of WOMAC Scores. The mean difference (Pre testing and twelfth week) scores suggests that Kinetic Therapy is significantly better in improving WOMAC Scores in comparison to Electro Thermo Therapy.

DISCUSSION

In this study, total 30 individuals were selected randomly and divided into two groups - group 1 and group 2 (15 patients in each group), who received Kinesiotherapy and Electrothermotherapy respectively. The improvement pain, knee flexion range of motion and function were assessed by using Goniometry, VAS and WOMAC scale. Pre-test data were collected at the beginning of the study and post-test data were collected at the end of 12th week. The data were statistically analyzed and compared to check effectivity of the therapy. The mean difference (Pre testing and twelfth week) scores suggests that Kinetic Therapy is significantly better (p<0.05) in improving Right and left knee flexion in comparison to Electro Thermo Therapy because it maintains joint integrity, improves flexibility of structures surrounding the joint. Electro Thermo Therapy is significantly better in improving VAS Scores of Right and left knee (p<0.05) in comparison to Kinetic Therapy because it directly work on pain gait theory and also improves blood circulation to the area and remove metabolic irritants. US aim to enhance soft tissue healing, decrease the inflammatory response, increase blood flow, increase metabolic activity, and decrease pain.The mean difference (Pre testing and twelfth week) scores suggests that Kinetic Therapy is significantly better in improving WOMAC Scores(p<0.05) in comparison to Electro Thermal Therapy because Kinetic exercises and Electro thermo therapy both reduces pain but Kinetic exercises emphasize on maintaining integrity of surrounding musculature as well as increases strength by resistance training.

CONCLUSION

When both training regimens were taken into consideration for significance of mean difference the result of study states that Kinesiotherapy is better than Electro thermo therapy in improving range and physical function, though it too reduces pain but Elcetro thermotherapy is better mode of choice in pain reduction. So, it can be concluded that Electro thermotherapy can be used as adjunct to

Kinesiotherapy in treatment of patient with knee osteoarthritis.

ABBREVIATION

OA: Osteoarthritis **ADL:** Activities of Daily Living **ROM:** Range of Motion **US:** Ultrasound **TENS:** Transcutaneous electrical nerve stimulation VAS: Visual Analogue Scale WOMAC: Western Ontario and McMaster Universities Osteoarthritis Index KF Right: Flexion range of motion of right knee KF Left: Flexion range of motion of left knee VAS Right: VAS score of right knee VAS Left: VAS score of left knee

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"A STUDY TO FIND OUT RELIABILITY AND CONCURRENT VALIDITY OF FULLERTON ADVANCED BALANCE SCALE FOR ASSESSMENT OF FUNCTIONAL BALANCE IN SCHOOL GOING CHILDREN: OBSERVATIONAL STUDY"

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Context: For the purpose of this study, functional balance in children is defined as the ability to maintain the center of mass with respect to the base of support during typical childhood activities of daily living, school, and play.

Aim: To find out reliability and concurrent validity of Fullerton advanced balance scale in school going children.

Settings and Design: The observational study was carried out in Shri U.S.B College of physiotherapy, Aburoad.

Method and Material: After the ethical approval from committee and written consent from guardian who were willing to participate in study, 52 schools going children were selected based on inclusion and exclusion criteria. Both the boys and girls, with age group 5 to 15 years were taken for the study. The children were assessed using FAB Scale by two rater for inter rater reliability and by same rater at different time (24 hours of duration) for intra rater reliability. The patients were also assessed by PBS to find out concurrent validity of FAB Scale.

Stastical analysis: Data was analysed by using SPSS Version 20. Intra and inter rater reliability and concurrent validity of FAB Scale were assessed by Spearman's correlation coefficient.

Results: Spearman's correlation coefficient value for Intra rater reliability is 0.782 , Inter rater reliability is 0.738 and concurrent validity is 0.751 which show moderately positive correlation of Intra rater, Inter rater reliability and concurrent validity of Fullerton Advanced Balance Scale with Pediatrics Balance Scale.

Conclusion: The Fullerton Advanced Balance Scale appears to be reliable and valid test to independent school going children affect movement to walk over obstacles, anticipatory control, dynamic gait and reactive postural control in various directions. The FAB Scale is an easy-to-administer, less equipment use and less time consuming clinical test with concurrent validity, intra rater reliability for assessment of functional balance in school going children.

Keywords: Inter rater reliability, Intra rater reliability, Concurrent validity, Fullerton Advanced Balance Scale (FAB), Pediatrics Balance Scale (PBS)

INTRODUCTION

Balance is the ability to maintain one's projected center of mass with respect to one's base of support to orient and align the body in space.1 Balance is a requisite component for successful completion of functional activities including locomotor and manipulative skills. For the purpose of this study, functional balance in children is defined as the ability to maintain the center of mass with respect to the base of support during typical childhood activities of daily living, school, and play.1

Examination of balance is an important element of a physical therapy evaluation for a school-age child. The clinician must predict the ability of the child to safely and independently function in a variety of environments (i.e. home, school, and community).2 Valid and reliable functional balance measures are of critical importance if the pediatric physical therapist is to justify that intervention is warranted and demonstrate that improved balance function has occurred as a result of intervention.2

Traditionally, pediatric physical therapists have

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examined balance through the observation of the underlying elements of the balance response, timed measures of static postures, and standardized developmental measures of gross motor function.3-6

Distinguishing among varying levels of balance ability and identifying patterns of impairment as part of early intervention require valid screening tools. There are several existing balance assessment tools for use with clinical populations; however, a prospective study of five clinical balance tests, including the Berg Balance Scale (BBS), 4 timed up-and-go (TUG), and Dynamic Gait Index (DGI), concluded that factors contributing to falls may interact differently at different ages and activity levels; current tests are not as successful in predicting fall risk in active older adults as they have been found to be in more frail populations.7

The Fullerton Advanced Balance (FAB) Scale is a relatively new multi-item balance-assessment test designed specifically to measure balance in higher-functioning active older adults. Content validity is based on theoretical analysis of components of static balance and dynamic balance control, sensory reception and integration, and anticipatory and reactive postural control. The test is composed of 10 items.7

The Pediatric Balance Scale (PBS), modified by based on Berg Balance Scale (BBS) has been used in several studies to assess balance ability in children, especially those with balance problem8

The FAB scale is a performance-based measure that was developed to identify the subtle changes in balance and comprehensively approach the multiple dimensions of balance (Rose et al, 2006). It includes items that are specifically designed to assess the balance abilities in higher functioning individuals and to assess the multiple dimensions of balance including both static and dynamic environments, and reactive postural control. PBS is easy to use and requires minimal equipment, it has been widely applied and therefore, translated into at least nine different languages (Darr et al, 2015). However, the PBS has several limitations. First, it does not include items that assess dysfunction of the multiple sensory systems such as the visual and vestibular systems associated with balance function during gait. 9

Fullerton Advanced Balance (FAB) Scale was developed by Debra Rose. FAB scale to develop a new balance assessment tool that could be used to identify balance problems of varying severity in functionally independent older adults and also evaluate more of the system (eg, sensory, musculoskeletal, neuromuscular) that might be contributing to balance problems. One of the advantages of the FAB scale is that it is quick to administer, requiring approximately 10 to 12 minutes. In contrast to the BBS, which is comprised of 14 test items, the FAB scale has only 10 test items. Each item is scored from 0-4. The maximum score is 40 points.10

NEED FOR THE STUDY

There are already many ways of measuring balance, but very less are suitable for use in the clinical setting to assess functional balance, the effects of individual rehabilitation interventions or to measure change over a short term and balance assessment in school going children is most important for physical assessment.

The Fullerton Advanced Balance Scale is convenient, quick, more challenging, easy to access with periodically and simple to administer for functional balance evaluation in school going children.

There is no study which finds the reliability and con-current validity of Fullerton Advance Balance Scale with pediatrics balance Scale. So, the purpose of this study was to find concurrent validity and reliability of The Fullerton Advanced Balance Scale for assessment of functional balance in school going children.

AIM OF THE STUDY

The aim of the study was to find out reliability and con-current validity of Fullerton advance balance scale for assessment of functional balance in school going children.

OBJECTIVES OF THE STUDY

1. To assess inter and intra-rater reliability of the Fullerton advanced balance scale for assessment of functional balance in school going children.
2. To assess concurrent validity of the Fullerton advanced balance scale for assessment of functional balance in school going children.

MATERIAL AND METHODS

STUDY SETTING: Shri U.S.B college of Physiotherapy, Aburoad

STUDY DESIGN: An Observational study

METHOD OF COLLECTION OF DATA:

Source of data collection: Ummed international school, ABUROAD.

Study population: school going children

Sampling method: Purposive sampling

Sample size: 52 subjects

Materials to be used: FIG: 1 (a - b)

- Consent form, Measurement form, Pencil and Pen
- 12 inch ruler
- 6 inch high stool
- Stop Watch
- Measure tape
- Chair
- Foam Surface
- Mini Mental Status Examination Scale
- Fullerton Advanced Balance Scale
- Pediatrics Balance Scale

FIG: 1(a) Material used in the study

FIG: 1(b) Foam Surface and 6 inch High stool used in the study

CRITERIA FOR SELECTION:

Inclusion Criteria:

- School going children between 5-15 years of age
- Independent standing(more than 4 sec)7
- Able to ambulate independently without assistive devices.

Exclusion Criteria:

- Subjects who have under gone medical procedures likely to affect motor function
- Severe abnormalities such as seizure, Mental retardation
- No participation in other therapeutic programs
- Orthopaedic surgery
- Use of assistive device.
- Learning disability

MEASUREMENT PROCEDURE

" The subjects have been selected on the basis of inclusion and exclusion criteria.

Before starting the study, brief assessment has been done by Mini Mental State Examination and consent was taken from the subjects as well as principal of the school.

subjects were then explained about the test and procedure to be conducted Fullerton Advanced Balance Scale conducted to check Functional balance in school going children. The FAB Scale was conducted twice by same rater (Rater A1 and Rater A2) at different time (after 24 hours of duration). PBS was taken to find out concurrent validity by rater A1.

RESULTS

All the statistical analysis was done by Statistical Package for the Social Sciences (SPSS) statistical software version 20.0 for windows.

Intra rater, inter rater reliability and concurrent validity of FAB Scale were assessed by Spearman's correlation coefficient. Level of significance (p value) was set to 0.01 level.

Table 1 - Age distribution of children (years)

AGE (YEARS)	NO OF SUBJECTS
5 - 7	13
8 -10	14
11 - 13	23
14 - 16	2
TOTAL	52

Table 2:- Mean value and Standard Deviation of Fullerton Advanced Balance Scale and pediatric balance Scale in children

Outcome Measure	Rater	Mean	Standard deviation
Fullerton Advanced Balance Scale	A1	38.750	± 1.266
Fullerton Advanced Balance Scale	B	39.096	± 1.142
Fullerton Advanced Balance Scale	A2	39.150	± 0.894
Pediatrics balance scale	A1	55.653	± 0.653

Table 3:- Spearman correlation coefficient showing Intra rater, Inter rater reliability and concurrent validity of Fullerton Advanced Balance Scale with Pediatric Balance Scale of children

MEASURE	SPEARMAN CORRELATION COEFFICIENT (r VALUE)	P VALUE
INTRA RATER RELIABILITY	**0.782	0.000
INTER RATER RELIABILITY	**0.738	0.000
CONCURRENT VALIDITY	**0.751	0.000

** Correlation is significant at the 0.01 level (p value <0.01)

Interpretation: table shows moderate positive correlation of Intra rater, Inter rater reliability and concurrent validity of Fullerton Advanced Balance Scale with Pediatric Balance Scale.

DISCUSSION

This study was conducted to check Inter, Intra Rater reliability and con-current validity of the Fullerton advanced balance scale for assessment of functional balance in school going children.

In the above study the results for intra, inter rater reliability and concurrent validity suggested moderate positive correlation with Rater A1 and Rater A2 both which suggest that functional balance can reliably and validly be measured in school going children by using Fullerton Advanced Balance Scale.

Balance impairments increase fall risk, resulting in high economic costs and social problem. Decreased muscle strength, range of movement, abnormal muscle tone, motor coordination, sensory organization, cognition, and multisensory integration can contribute to balance disturbances at different levels.6

Result of present study suggested that Fullerton advanced Balance Scale is reliable and valid tool to asses balance in post stroke patients and this is supported by a study done by Debra J. Rose in 2006 et al; Development of a Multidimensional Balance Scale for Use With Functionally Independent Older Adults and concluded that Preliminary results suggest that the FAB scale is a valid and reliable assessment tool that is suitable for use with functionally independent older adults residing in the community.7

Item 10 (reactive postural control) was found to measure a balance-control mechanism different from that measured by the other nine FAB scale items. Item 10 is intended to measure an individual's ability to respond quickly to an unexpected loss of balance using a protective and involuntarily controlled righting response.8

During the study it was observed that in FAB Scale Item 5 (Tandem walk), Item 6 (Stand on one leg) and Item 8 (Two footed jump) are more difficult in subjects. It is more challengeable items to perform in children.

Penelope J. Klein et al, (2009), conducted a study on research analysis of the Fullerton advanced balance scale and concluded that the scale appears to be a reliable and valid tool to assess balance function in older adults. The test was found to discriminate among participants of varying balance abilities. It also determine the test is for diagnostic prescriptive utility. 8

The present study finding suggests that Fullerton Advanced Balance scale is reliable and valid scale to measure Functional balance in school going children.

Limitation of the study

Small sample size, specific age criteria for study population was not taken in to consideration.

Further recommendation

Study can be performed in specific age criteria and Physiotherapist with different years of experience can be taken to check inter rater reliability.

Acknowledgement

I am first thankful to Almighty God and my family for blessings. I extend my sincere thanks to my respected staff Dr. Sarfraj khan, Dr. Sadhana joshi, Dr. Nandan Das. I am also thankful to Mr. Dhanraj sir for their support.

CONCLUSION

The Fullerton Advanced Balance Scale appears to be reliable and valid test to school going children affect movement to walk over obstacles, anticipatory control, dynamic gait and reactive postural control in various directions. The FAB Scale is an easy-to-administer, less equipment use and less time consuming clinical test with concurrent validity, intra

rater reliability for assessment of functional balance in children.

Conflict of Interest: Nil.

Source of Fund: No fund was needed.

Ethical Clearance: From Shri U.S.B college of Physiotherapy, Aburoad.

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Effect of RMNS to improve arousal in comatose patients post-Acute TBI: A Literature Review

Rajendra Kachhwaha

Abstract

Introduction

Traumatic brain injury (TBI) is a non-degenerative, non-congenital insult to the brain from an external mechanical force, possibly leading to permanent or temporary impairment of cognitive, physical, and psychosocial functions, with an associated diminished or altered state of consciousness, The global incidence rate of TBI is estimated at 200 per 100 000 people per year . About 17% of people who survive TBI have a period of complete unconsciousness or coma with no awareness of themselves or their surroundings. Right median nerve electrical stimulation has been reported as a simple, inexpensive, non-invasive technique to speed recovery and improve outcomes for traumatic comatose patients.

Objective

A review study done to evaluate the efficacy of RMNS to improve arousal and in comatose patient post-acute TBI.

Methods

A systematic bibliographic search was undertaken using the principal search engines (Pubmed,

Embase, Medline, CINAHL and Cochrane databases) to locate the most pertinent studies in English between 1999-2017. Any study design was accepted but the studies considered have at least one severe posttraumatic patient in the sample population and receive RMNS during comatose condition.

Result and Discussion

Total of 25 articles were found, of which 17 were excluded because they did not meet the inclusion criteria. 8 articles were used for analysis and discussion. Many studies suggest that when RMNS employed early in coma helpful in shortened time in ICU and quality of final outcome can be enhanced.

Conclusion

This literature review concludes that RMNS is an easy, safe, inexpensive and non invasive technique to arouse the moderate to severely comatose patient and it could be conceived as an alternative or in association with the other treatments.

Keywords: Traumatic brain injury, Comatose patient, Right median nerve electrical stimulation

INTRODUCTION

Traumatic brain injury (TBI) is a non degenerative, non congenital insult to the brain from an external mechanical force, possibly leading to permanent or temporary impairment of cognitive, physical, and psychosocial functions, with an associated diminished or altered state of consciousness, The global incidence rate of TBI is estimated at 200 per 100 000 people per year(1). Traumatic brain injury (TBI) is a leading cause of disability in all regions of the globe TBI may result In significant loss of an individual functioning-physical, cognitive and psychological. About 17% of people who survive TBI Have a period of complete unconsciousness or coma with no awareness of themselves or their surroundings (2). coma lasts for a couple of days, and once the patients open their eyes they evolve into a vegetative state. Then they may enter minimally conscious state after Showing some signs of consciousness and eventually they recover full consciousness. In rare cases, a person may develop locked-in syndrome, a nearly complete paralysis of the body's voluntary motor responses .The most severe TBI causes profound disturbances of

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consciousness. Patient in coma experience sensory deprivation due to decrease the ability to respond to internal and external stimuli and increase in threshold of activation of reticular activating system so a controlled higher stimulation thus is required to generate action potential in reticular neurons to increase cortical activity . The undamaged neurons may actually send out collateral connection called collateral sprouting which assist in reorganizing the brain activity. Electrical stimulation may serve as a catalyst to enhance central nervous system functions and The right median nerve has been chosen as a portal to electrically stimulate and help Arouse the central nervous system for persons with reduced levels of consciousness. The right median nerve is easily accessible and is chosen as a gate to activate the brainstem and the cerebrum because of its spinoreticular component that synapses with neurons of the ascending reticular activating system: its stimulation is today considered among the modalities to facilitate arousal. (3) The RMNS has also been related to a significant increase in cerebral blood flow and to improvements in electroencephalogram. (3,4) Right median nerve electrical stimulation has been reported as a simple, inexpensive, non-invasive technique to speed recovery and improve outcomes for traumatic comatose patients.

Objective

To review the literature to evaluate the efficacy of RMNS to improve arousal and in comatose patient post acute TBI. The aim of this review is to clarify the indications for the RMNS techniques and to guide the clinical practice towards an earlier coma arousal.

Methods

This is a review of the literature, addressing the efficacy of RMNS to improve arousal in comatose patients post Acute TBI.

Data search and study selection

A systematic bibliographic search was undertaken using the principal search engines(Pubmed,Embase, Medline, CINAHL and Cochrane databases) to locate the most pertinent studies in English between 1999-2017. Any study design was accepted but the studies considered have at least one severe posttraumatic patient in the sample population and receive RMNS during comatose condition. The key words were "Right median nerve stimulation" combined with "post traumatic coma", "coma arousal " , " head injury " or" brain injury " used. the related articles function was used to broaden the search, and articles identified in review papers or in reference Lists but not included in the original search were also considered. All abstracts and citations scanned were reviewed. Included articles were evaluated for the following: study design, sample size, type of treatment and outcome measures. All articles not specifically regarding RMNS to enhance arousal or recovery from post-traumatic head injury coma were excluded.

Parameters used in RMNS

Type of current - Faradic current

Wave form - Asymmetrical biphasic

Amplitude - 20mA

Pulse duration - 300ms

Pulse Frequency - 40 Hz

On time -20 sec./min

Off time -40 sec./min

Electrode Placement

Figure1: Electrode Placement

Electrode Placement

Active electrode- volar aspect of right side forearm sensory pathway for RMNS

Inactive electrode- volar aspect of lower 2/3 of right forearm

Duration - 30 min -1 hour/Day

Result

Total of 25 articles were found, of which 17 were excluded because they did not meet the inclusion criteria. 8 articles were used for analysis and discussion. To better understand the data, the articles and their results were grouped in their own table, containing: author and year of publication; study design; sample size and outcomes.

Discussion

Right median nerve electrical stimulation has been adopted as a safe, inexpensive, noninvasive

therapy for the neuroresuscitation of coma patients for more than two decades. There are several advantages to stimulating the right median nerve instead of other parts of body. First, the right median nerve is a peripheral portal to the central nervous system, and the sensory representation of the hand in the cortex is disproportionately large compared to other parts of the body. Second, Broca's motor/speech planning area is in the left frontotemporal region in most individuals. Several possible mechanisms may underlie the effects of this treatment. The first is that the spinoreticular component of the median nerve pathway synapses with neurons of the ascending reticular activating system (ARAS) [5]. The ARAS is a complex neural network connecting the reticular formation of the brain stem to the cerebral cortex via excitatory relays in the intralaminar nuclei of the thalamus. Therefore, the ARAS plays an important role in maintaining a state of wakefulness [6]. Studies have shown that the ARAS is activated by RMNS applied with a painful intensity[30], which may be a pathway for the therapeutic function of electrical stimulation.

A second mechanism is related to neurotrophins such as nerve growth factor and brain-derived neurotrophic factor (BDNF). Neurotrophic factors, which play an important role in neuroplasticity, may promote synaptic remodeling and changes in receptor expression or activation [7]. Previous studies have found that BDNF might enhance the survival of neurons after a hypoglycaemic coma [8]. Studies have also shown that BDNF levels increase in environmental enrichment animals compared to those housed in standard conditions[8]. RMNS, serving as a type of environmental enrichment, may raise the concentration of neurotrophins, leading to the survival of more neurons and hastening the recovery of comatose patients. Increases in cerebral blood flow may be another pathway through which RMNS functions. In a research project conducted by Liu and colleagues, six comatose patients underwent SPECT scans for cerebral perfusion evaluation before and after the stimulation, and brain perfusion was found to have increased in all cases [9]. Other mechanisms include RMNS-induced changes in neurotransmitters such as dopamine and glutamate and improved electroencephalogram activity [10,11]

RMNS is an easy technique, with a safety profile and cost effective, and it seems to be followed by an earlier arousal and better cognitive outcomes. Also, this technique finds an application in the acute care setting and it could be conceived as an alternative or in association with the pharmacological treatment . e important point is the patient ' s selection: patients with severe cardiac arrhythmias, implanted defibrillators, pacemakers, uncontrolled seizures, cervical spinal cord or brachial plexus injury, large intracranial hematomas, gunshot wound to the head, right median nerve injury, or positive pregnancy may not get benefit of this technique. (12).

From present literature review we found that after median nerve stimulation there is increase in level of consciousness, improvement in speech which helped in faster recovery of patients so right median nerve stimulation can be included as treatment in clinical practice to improve consciousness.

Conclusions

TBI is an highly individualized process and the subsequent impairments are dependent on multiple factors as neurotransmitter disturbance, lesion site, co morbidity and injury severity. Is heterogeneity obviously influences therapeutic responses to any given interventions. This literature review concludes that RMNS is an easy, safe, inexpensive and non invasive technique to arouse the moderate to severely comatose patient and it could be conceived as an alternative or in association with the other treatments.

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"ADVANCE APPROACH EFFECTIVNESS OF PNF TECHNIQUE FOR BELL'S PARASIS CASE CONTROL STUDY ALONG WITH CONVENTIONAL PT"

Arushi Tandon* Pragya Bhatt**

ABSTRACT

Background: - Bell's palsy and idiopathic facial palsy are considered to be synonymous and specify an acute, mono synaptic, unilateral peripheral paresis of unknown etiology. There arevarious methods of treating Bell's palsy. Weakness in facial muscles called Bell's paresis.

Among the non-Surgical methods there is no specific method accepted universally. PNF is recent technique used for management of Bell's paresis.

Aims and Objectives: - This study is to evaluate the effectiveness of electrical stimulation with proprioceptive neuromuscular facilitation versus electrical stimulation without proprioceptive neuromuscular facilitation for Bell's paresis.

Methods and Measures: - 30 individual who were diagnosed to have long term bell's paresis by qualified neurologist or physicians were chosen and were randomly divided into two groups. (Group A (N=15) & Group B (N=15)).The group A was treated with proprioceptive neuromuscular facilitation therapy with electrical stimulation (One session per day for ninety days).The group B was treated with alone electrical stimulation (One session per day for ninety days). Both the groups were assessed for facial symmetry, synkinesis and other expressions of face using House Brackmann Scale and Manual Muscle Testing at Day0, Day 45, and Day 90

Keyword: - Bell's paresis, PNF Technique, Conventional PT.

Background of the problem

Facial paralysis is a relatively common disorder with numerous etiologies striking thousands of people of all ages annually. Complete recovery occurs in 71% of bell's Palsy cases without medical intervention, 13% showed only persistent residual palsy and the remaining 16% resulted in affair to poor recovery.

It is associated with several distinct disease entities like herpes simplex virus infection,, and side effects of influenza vaccine.

Facial neuro-muscular dysfunction is a complex problem that affects people in different ways. Patients may have strength deficits, control problems or relaxation difficulties.

Synkinesis is defined as an involuntary or abnormal movement that is associated with a desired movement or motion.

Those with facial muscle paralysis may have difficulty with eating, drinking and speaking, and difficulty in making facial expressions.

Facial Synkinesis is a common sequel to Idiopathic Facial Nerve Paralysis, also called Bell's palsy or Facial Palsy.

Bell's palsy, which occurs due to the compression of the seventh cranial nerve, results in a hemi facial paralysis due to non-functionality of the nerve. As the nerve attempts to recover nerve mis wiring results. In patients with severe facial nerve paralysis, facial synkinesis will inevitably develop.

A common treatment option for facial palsy is to use electrical stimulation. Unfortunately, this has been shown to be disruptive to normal re-innervation and can promote the development of synkinesis.

The most common symptoms of facial synkinesis included,

- Eye closure with volitional contraction of mouth muscles
- Mid facial movements with volitional eye closure
- Neck tightness (Platysmal contraction) with volitional smiling

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- Hyper lacrimation (also called Crocodile Tears)

A case where eating provokes excessive lacrimation. This has been attributed to neural interaction between the salivary glands and the lacrimal glands

On basis of location of lesion, facial nerve palsy is broadly classified into two types1, 7

1. Upper Motor Neuron Lesion:- in this the upper facial muscles are partially spared because of almost bilateral cortical representation (alternative pathways in the brainstem) and only the lower half of the contralateral side is affected i.e. The patient can wrinkle their forehead and sagging of the face is not as prominent as is lower motor neuron palsies.

2. Lower Motor Neuron Lesion: - in this the patient cannot do any of the voluntary movement of the ipsilateral half of the face, loss of taste sensation and autonomic function .lesion must be either in the pons or outside the brainstem (posterior fossa, boney canal, middle ear or skull)

It affects both genders equally and is less frequent in children then adults.it shows relatively weak association with hypertension and diabetes, particularly in older patients. Recurrence, on the same or opposite side is relatively common1.

Function of facial muscles

Raising the eyebrows (frontalis)

Closing the eyes (orbicularis oculi)

Frowning (corrugator)

Open mouth smiling (zygomaticus)

Closed mouth smiling (risorius)

Pouting (orbicularis oris)

Lifting top lip (levatorlabii)

Pulling lower lip down (depressor labii)

Sticking bottom lip out (mentalis)

Pulling jaw and corners of mouth gently down (platysma)

Wrinkling nose (procerus/nasalis)

The Conventional physiotherapy to treat facial palsy includes:-

1. Facial Massage: - To relax muscles, provide rest to the muscles, release the tightness (if any), to wash out waste products from the muscles during the inactivity of them and to promote better functioning of these muscles.

2. Facial Electrical Stimulation: - Galvanic current given via pen electrode directly over the facial muscles bellies and faradic current for facial nerve branches and nerve trunk.

3. Eye Care: - By regularly cleaning eye, putting eye lubricants as prescribed by doctor and wearing goggle to prevent drying of eye (cornea). Tears play an important role in protecting your eyes and keeping them free of the dirt and bacteria that can cause eye infections.

Doctor May prescribe eye drops that contain 'artificial tears' for daytime use, plus an ointment that you should use at night. If you're unable to shut your eye at night time, your Doctor will give you some surgical tape to close your eye.

If your eye symptoms get worse, your Doctor should ask to refer you to the facial palsy clinic or ophthalmology department of your local hospital for assessment. If ointments and taping are not effective you may benefit from surgery to help protect your eye.

4. Gum Care: - Regularly washing mouth thoroughly after every meal and brushing twice day.

5. Facial Exercises: - Like filling air in balloons, filling air in cheeks and releasing it from mouth, drinking liquids from straw, closing eye and slowly opening them, pouting, pronunciation of vowels(a,e,i,o,u)several times a day, etc.

6. Resolving of inflammation: - In initial seven to ten days either SWD or IR could be given to increase the circulation in the stylomastoid foramen so that inflammation can be resolved.

All these were given as regular physiotherapy protocol for facial palsies and paresis but then too rate of recovery and percentage of recovery in terms of severity were poor. Plus permanent disfiguring changes like synkinesis were common.

Around thirty percent patients did not to recover, they have residual palsy/paresis with or without synkinesis and permanent loss of symmetry of face at rest or during movement. And nothing much was available to treat this residual facial symmetry.

Conventional treatment is most commonly used treatment for facial nerve paralysis, it is an old method of treatment, and it includes electrical stimulation, massage and facial expression exercise. Facial massage includes stroking, effleurage, finger kneading, and will help to stimulate the muscle.

Proprioceptive Neuromuscular Facilitation (PNF Technique)

Proprioceptive Neuromuscular Facilitation: Is a philosophy and a method of treatment was started by

Dr. Herman Kabat in 1940s. Dr. Herman Kabat defines Proprioceptive

Neuromuscular Facilitation as - having to do with any of the sensory receptors that give information concerning movement and position of the body, involving the nerves and the muscles making easier.

Kabat (1947) wrote that prevention of motion in a stronger synergist will redirect the energy of that contradiction into a weaker muscle. This alteration of timing stimulates the Proprioceptive reflexes in the muscles by resistance and stretch. When we use bilateral movements while exercising the face, contraction of the muscles on the stronger or more mobile side will facilitate and reinforce the action of the involved muscles. Timing for emphasis, by preventing full motion on the stronger side will further promote activity in the weaker muscles.1

Proprioceptive neuromuscular facilitation (PNF) is a manual resistance technique that works by simulating fundamental patterns of movement, it hastens the response of the neuromuscular mechanism through stimulation of the proprio ceptors; could result in either facilitation or inhibition. It has been reported to permit improvement in function of facial muscles. It facilitates flexibility, strength and co-ordination.

Electrical Muscle Stimulation

Electrical Muscle Stimulation (EMS): Electrical stimulation stimulates muscles, nerves or a combination of both. The physiological effects of stimulation are used therapeutically to strengthen muscles, assist in wound healing, relieve pain and reduce edema. An externally applied stimulus can cause depolarization of the nerve and thus initiate an action potential as long as the applied stimulus depolarizes the resting membrane potential to the threshold level.

Interrupted direct current (I.D.C.) with pulse duration of100ms, given to the muscles of the face. Each patient will receive 90 contractions per treatment session and treatment program with electrical stimulation will be carried out once a day.

Methodology

30 individual who were diagnosed to have long term bell's paresis by qualified practioner were chosen and were randomly divided into two groups. (Group A (N=15) &Group B (N=15)).The group A was treated with proprioceptive neuromuscular facilitation therapy with electrical stimulation (One session per day for ninety days).The group B wastreated with alone electrical stimulation (One session per day for ninety days). Both thegroups were assessed for facial symmetry, synkinesis and other expressions of face using House Brackmann Scale and Manual Muscle Testing at Day 0, Day 45, and Day 90.The results were statistically analyzed.

RESEARCH METHODOLOGY

Research Approach

To find solution to statement of problem, this study was designed as a comparative study between electrical stimulation with proprioceptive neuromuscular facilitation versus electrical stimulation without proprioceptive neuromuscular facilitation to find which technique is better to restore facial symmetry in Bell's paresis.

Research Design

It will be a comparative study design. A sample of 30 subjects will be included in the study with pre-test & post-test study design. The subjects will be selected by convenient sampling method .All patients were required to give written informed consent prior to participation in the study.

Place of Study

The study was executed

- Shramjeevi OPD

Population

- All patients between the ages of 25-65 were included.
- Both genders were equally eligible for the study.

Sample

30 patients with long term facial paresis were included on the basis of physical examination of the paresis.

Sampling method

Samples were randomly chosen from the references made by Doctors and from out patients department observing the inclusion and exclusive criteria.

Inclusion Criteria

- Patients with peripheral unilateral idiopathic facial palsy after 30 days of onset (sub-acute stage).
- Age group between 25 - 65 years.
- Patient must give the written informed consent.
- Both males and females.
- Both right and left side

- Patients who had paresis of grade 2 and more on manual muscles testing
- All patients who understood my verbal instruction were able to read and follow the chart of instructions and exercise provided by me.

Exclusion Criteria

- Patient with history of recent head injury, Neurological disorders.
- Patient with history of immunodeficiency syndromes.
- Viral infections like herpes simplex
- Bell's palsy of time duration less than 1 month and more than 3 years.
- Subjects with the history of surgical intervention for facial nerve palsy.
- Subjects with other form of neurological impairments.
- Subjects with pain of any other origin.
- Subjects with any deformity or disability requiring medical attention.
- Subjects with age less than 25 or greater than 65 years.
- Subjects with cognitive/perceptual impairment.
- Open wound.
- Patient with metal implants.
- Patients who had skin diseases and superficial skin infection.

Time and Duration of study

Samples of 30 patients of Bell's palsy were divided randomly into two groups.

Group A = PNF with electrical stimulation (n=15)

Group B = Electrical stimulation with conservative treatment (n=15)

Group A was treated with PNF with electrical stimulation each day for 90 days.

Group B was treated with electrical stimulation without PNF each day for 90 days.

Data was assessed on Day 0, Day 45, and Day 90.

Group A: Total treatment time was around 60 minutes per session

1. Electrical Stimulation

Position of Patient: - Supine Lying

Patient was given

(a) 5 sets of 30 repetition of galvanic stimulation for each facial muscles till visible Contraction seen (5 sets x 30 repetition = 150 contractions) muscles included were frontalisnasalis, buccinators, risorius, zygomaticus, orbicularis oris, depressor angulioris, and depressor labii inferioris.5

(b) 5 sets of 10 repetition of faradic stimulation for facial nerve trunk, its upper, middle, lower branch respectively (5 sets x 10 repetition = 50 contractions).

2. Than a 2 Minute rest was provided to the patient.

3. Proprioceptive Neuromuscular Facilitation Therapy

Position of Patient: - Supine Lying

This was given in the following manner,

PNF for facial muscles20

1. Muscle Frontalis: ask the patient to lift eye brows up, look surprised wrinkle your forehead.

- Apply resistance to the forehead, pushing caudally and medially. This motions works with eye opening. It is reinforced with neck extension.

2. Muscle corrugators supercilli: ask the patient to pull eye brows down (frown)

- Apply resistance just above the eye brows diagonally in a cranial and lateral direction.

This motion works with eye closing.

3. Muscle orbicularis oculi: ask the patient to close the eyes. Separate exercise for upper and lower eye lids.

- Avoid putting pressure on the eyeballs.2 previous motions are facilitated by neck flexion.

4. Muscle procerus: ask the patient to wrinkle your nose.

- Apply resistance next to the nose diagonally down and out. This muscle works with muscle corgurrator with eye closing.

5. Muscle orbicularis oris: ask the patient to purse the lips whistle and say prunes.

- Apply resistance laterally and upward to the upper laterally and downward to the lower lip.

6. Muscle mentalis: ask the patient to wrinkle the chin.

- Apply resistance down and out of the chin

Note: patient were taught, explained and motivated to carry PNF Therapy as home program one more time a day except the usual protocol.

Group B: Total treatment time was around 45 minutes per session.

This was given in the following manner,

1. Electrical Stimulation

Position of Patient: - Supine Lying

Patient was given

(a) 5 sets of 30 repetition of galvanic stimulation for each facial muscles till visible contraction seen (5 sets x 30 repetition = 150 contractions) muscles included were nasalis, buccinators, risorius, zygomaticus, orbicularis oris, depressor angulioris and depressor labiiinferioris.5

(b) 5 sets of 10 repetition of faradic stimulation for facial nerve trunk, its upper, middle, lower branch respectively (5 sets x 10 repetition = 50 contractions).

2. Than a 2 Minute rest was provided to the patient.

3. Conventional Physiotherapy

Exercises for facial expression using postural mirror

A) Look surprised then frown

B) Squeeze eyes closed then open wide

C) Smile, grin, and say 'o'.

D) Say a, e, i, o, u.

E) Hold straw in mouth-suck and blow

F) Whistle

o Massage

i. Stroking

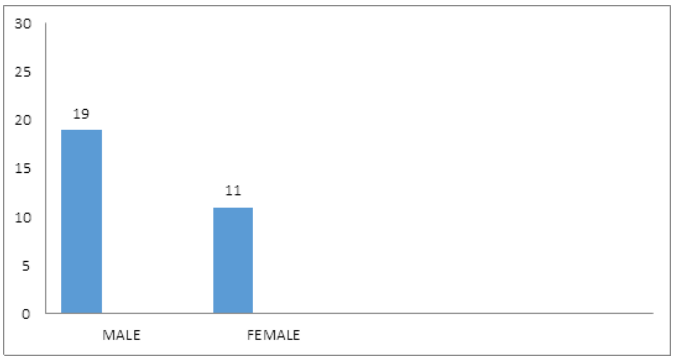
ii. Effleurage

iii. Finger kneading

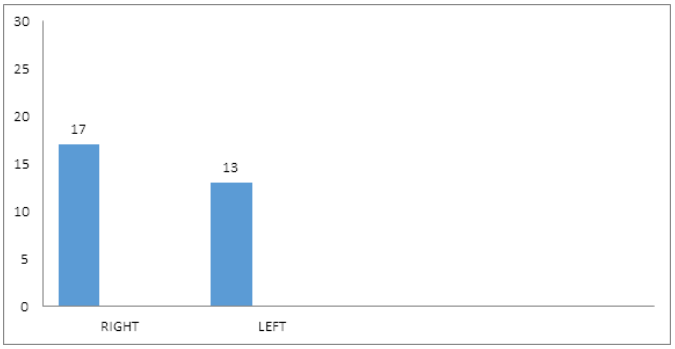
Note: patient were taught, explained and motivated to carry Conventional Therapy as home program one more time a day except the usual protocol.

DEMOGRAPHIC PRESENTATION OF DATA

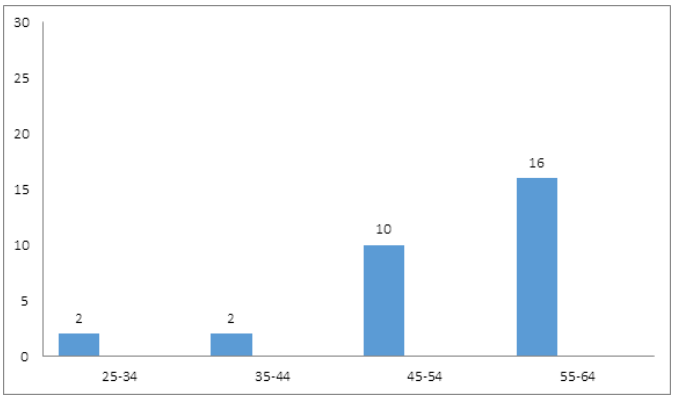
Graph No.1-Gender



Graph No.2- Affected side



Graph No.3- Age Groups



ANALYSIS AND INTERPRETATION

Table No.1

Mean age of patients in both groups (Graph no.4)

	Group A	Group B
MEAN AGE (In years)	55.66	55.80
SD (In years)	7.48	6.83

The mean age of Group A is 55.66 and Group B is 55.80.

So, there is no significant difference between mean ages of both groups.

Table No.2

Test of Homogeneity: One Way ANOVA

1. for HBS

	Sum of Squares	Degree of Freedom(df)	Mean Square
Between the group	0.00	1	0.00
Within the group	14.59	28	0.52
Total	14.59	29	
F Statistic=0.0000		P>1.000	

2. for MMT

	Sum of Squares	Degree of Freedom(df)	Mean Square
Between the group	0.00	1	0.30
Within the group	13.39	28	0.55
Total	13.39	29	
F Statistic=0.0000		P>0.475	

Table No. 3

Within group analysis on House Brackmann Scales (Graph No.5)

Out come measure	Day 1 N=15 M±SD	Day 45 N=15 M±SD	Day 90 N=15 M±SD	ANOVA		Two-tailed t-test Value	
				F	P	0 Vs. 45	0 vs. 90
Group A	3.93 ± 0.70	2.86 ± 0.51	1.73 ± 0.45	61.70	P<0.01	4.73 (P<0.01)	10.14 (P<0.01)
Group B	3.93 ± 0.79	3.46 ± 0.51	2.66 ± 0.72	14.17	P<0.01	1.90 (P<0.05)	1.62 (P<0.01)

Calculated value of F test of HBS within both individual groups separately is more than the table values at 0.01 levels this indicates there was

significant improvement in HBS in both group separately which is significant at 0.01 levels.

Calculated value of T-test of HBS within both individual groups is more than the table values at 0.01 levels this indicates there was significant improvement in HBS in group A at 0.01 level on 0 vs. 45 day and 0 vs. 90 days, while in group B on day 0 vs. 45 level of significance is 0.05 and for day 0 vs. 90 it is significant at 0.01 level.

Table No. 5

Between Group Analysis on Day 45(Graph No.7)

Outcome measure	Group	Day	Mean	SD	Two-tailed T-test value	Level of Significance
House Brackmann Scale	A	45	2.86	0.51	3.35	P<0.05
	B	45	3.46	0.51		
Manual Muscle Testing	A	45	2.66	0.48	3.13	P<0.01
	B	45	2.46	0.51		

In comparing improvement on day 45 between both the groups:-

(A). Calculated T-test value for HBS is significant at 0.01 level.

(B). Calculated T-test value for MMT is significant at 0.01 level.

This is indicates there is significant difference in improvement in two scales in between group analysis of both the groups on day 45.

Table No. 6

Between Group Analysis on Day 90 (Graph No.8)

Outcome Measure	Group	Day	Mean	SD	Two-tailed T-test value	Level of Significance
House Brackmann Scale	A	90	1.73	0.45	4.40	P<0.05
	B	90	2.66	0.72		
Manual Muscle Testing	A	90	4.20	0.56	5.79	P>0.05
	B	90	3.53	0.51		

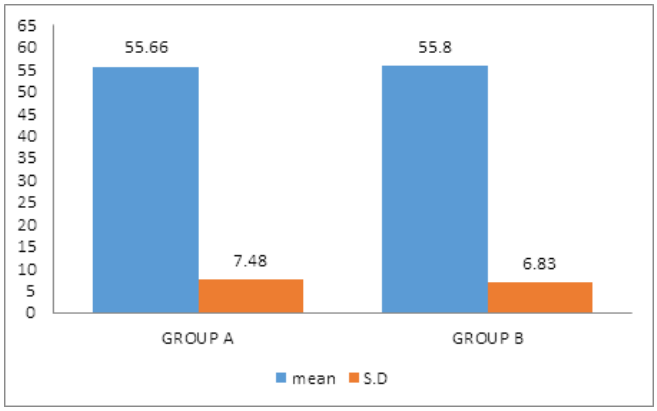
In comparing improvement on day 90 between both the groups:-

(A). Calculated T-test value for HBS is significant at 0.01 level.

(B). Calculated T-test value for MMT is significant at 0.05 level.

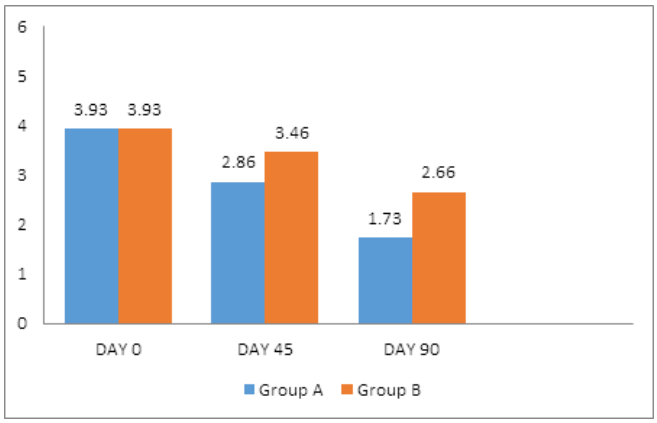
This is indicates there is significant difference in improvement in two scales in between group analysis of both the groups on day 90.

Graph No.4 - Mean age of patients in both groups



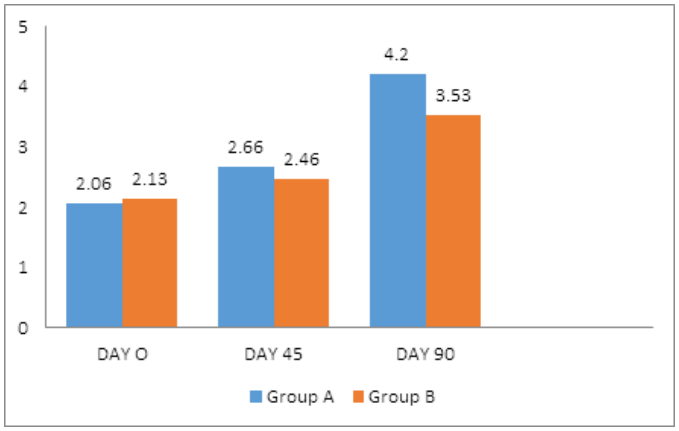
Mean age (yrs) **Groups**

Graph No.5 – Within group analysis on House Brackmann Scale



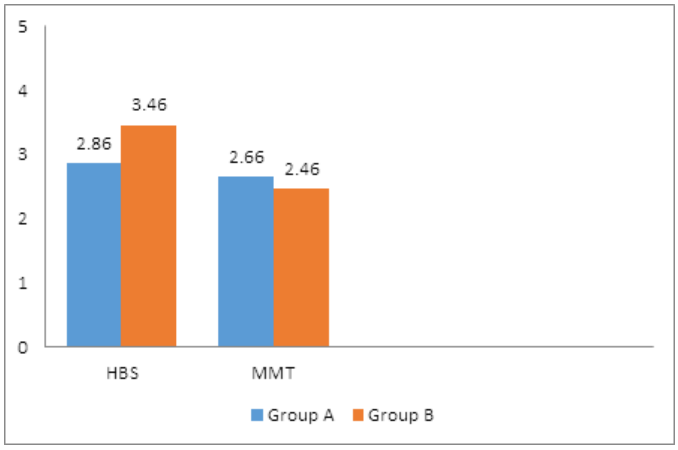
Grade of HBS **Days**

Graph No.6 – Within group analysis on Manual Muscle Testing



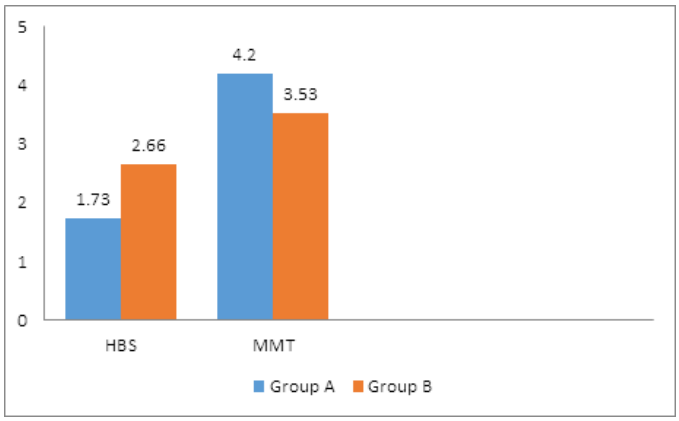
Grade of HBS **Days**

Graph No.7 – Between group analyses on day 45



Mean score **Outcome measures**

Graph No.8 – Between group analyses on day 90



Mean score **Outcome measures**

Discussion

The purpose of this study was to conduct a comparison between effectiveness of electrical stimulation with proprioceptive neuromuscular facilitation versus electrical stimulation without proprioceptive neuromuscular facilitation for the Bell's paresis in clinical situation for facial symmetry, by looking at symmetry at rest, symmetry during activity and synkinesis.

Results indicated that both group reduced significantly over time ($P<0.01$) in within group analysis. This proves that electrical stimulation with proprioceptive neuromuscular facilitation as well as electrical stimulation without proprioceptive neuromuscular facilitation both is individually beneficial over time for improvement in Bell's paresis.

More interestingly discussing about between group analysis on Day 45 and Day 90 both, there was significant difference between two groups overtime ($P<0.05$) that indicates that electrical stimulation with proprioceptive neuromuscular facilitation group reduced in severity on HBS scale and improved strength in MMT much better than the electrical stimulation without proprioceptive neuromuscular facilitation group.

Proprioceptive neuromuscular facilitation work to prevention of motion in a stronger synergist will redirect the energy of that contradiction into a weaker muscle. This alteration of timing stimulates the Proprioceptive reflexes in the muscles by resistance and stretch. When we use bilateral movements while exercising the face, contraction of the muscles on the stronger or more mobile side will facilitate and reinforce the action of the involved muscles. Timing for emphasis, by preventing full motion on the stronger side will further promote activity in the weaker muscles.

Plus in long term facial nerve palsy cases, longer duration electrical stimulation promotes nerve sprouting, regeneration and muscle re-innervation. Except that it maintains muscle contraction and so inheritant properties of muscles are maintained by this, which are generally lost over time if not taken care of.it prevent muscle atrophy as well.

Thus on the basis of our results we find that combination of both, Proprioceptive neuromuscular facilitation as well as Electrical stimulation work better.

Results of the study

The result of the study for within group analysis indicates that in comparative analysis of pre and post treatment data, both groups improved significantly ($P<0.01$) on all the scales in terms of symmetry at rest, symmetry during activity and synkinesis.

This proves that electrical stimulation with proprioceptive neuromuscular facilitation as well as electrical stimulation without proprioceptive neuromuscular facilitation both is individually beneficial over time for improvement in Bell's paresis.

Furthermore between group analysis of pre and post study reveals that electrical stimulation with proprioceptive neuromuscular facilitation group reduced in severity on HBS scale and improved strength in MMT much better than the electrical stimulation without PNF group in Bell's paresis.

Conclusion

The result obtained from the study demonstrated that both electrical stimulation with proprioceptive neuromuscular facilitation group and electrical stimulation without proprioceptive neuromuscular facilitation group showed significant results and displayed efficient improvement in facial symmetry after 90 days of treatment. When compared with electrical stimulation without proprioceptive neuromuscular facilitation group, electrical stimulation with proprioceptive neuromuscular facilitation group showed significant improvement in reducing facial disability and synkinesis. Therefore proving that, electrical with proprioceptive neuromuscular facilitation is more effective than electrical stimulation without proprioceptive neuromuscular facilitation with conventional therapy in Bell's paresis rehabilitation and experimental case control study hypothesis of this study is accepted.

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Effect of Myofascial Release vs Low-Dye Tapping in Patients with Plantar Fasciitis

Satya Bhushan Nagar

Abstract:

Purpose: Plantar fasciitis is one of the most common conditions that causes of heel pain. The purpose of this study was to evaluate the effect of myofascial release vs low- dye taping on pain in patients with plantar fasciitis.

Method: 36 subjects with clinical diagnosis of chronic plantar fasciitis were selected according to convenient sampling method and equally assigned into 3 groups as Group A(n = 12) , Group B (n =12) , Group C (n =12) . All groups received therapeutic Ultrasound, calf stretching exercise, where addition to exercises Group B received Myofascial release for plantar fasciitis and Group C received low -dye taping. Treatment was given for 12 days. Data was analysed by using SPSS software version 16.

Result: All three groups' shows significant reduction of pain. Between groups analysis, group B showed more significant reduction of pain.

Conclusion: The finding of this study was that the use of myofascial release along with calf stretching and ultrasound are more effective in improving pain in plantar fasciitis.

Keywords: Plantar Fasciitis, Myofascial Release, Low-Dye Tapping, Ultra Sound, Calf Stretching

Introduction

Plantar Fasciitis (PF) is a common painful disorder of the heel and plantar surface of the foot characterized by inflammation, fibrosis or structural deterioration of the plantar fascia of the foot. The plantar fascia is a thick fibrous band of connective tissue that originates from the medial tubercle of the calcaneus (heel bone) and extends along the sole of the foot towards the toes and supports the arch of the foot. [1] The most common causes of PF are overuse activities, or poor biomechanics, resulting in abnormal functional pronation. [2] Functional risk factors include tightness and weakness in the gastrocnemius and soleus muscles, Achilles tendon and intrinsic foot muscles, a stiff subtalar joint, non-weight bearing rear foot varus or functional leg length inequality, obesity, training error, improper foot wear and occupation involving prolonged standing are risk factors of plantar fasciitis. [2] In the presence of these risk factors, excessive tensile forces may cause micro-tears in the plantar fascia. Repetitive trauma to the plantar fascia exceeding the fascia?s ability to recover may lead to degenerative changes and an increased risk of injury. Various attempts have been made till date to treat plantar fasciitis including rest, orthoses, stretching, mobilization, myofascial release, electrotherapeutic modalities such as ultrasound, laser. Myofascial release also helpful in reducing pain and improve functional ability as this technique have been shown to release fascia restriction and restore its tissue. This technique is used to ease pressure in the fibrous bands of the connective tissue or fascia. Gentle and sustain stretching of myofascial release is believed to free adhesion and soften and lengthens the fascia. [3] Low dye taping is a means of controlling pain by supporting the internal structures with externally applied non- elastic adhesive tape. Low -dye taping stabilizes the head of the first metatarsal during plantar flexion, prevents excessive pronation, reduces stress on the origin of the plantar fascia and provide rapid pain relief.[4] So, the main objective of this study were to determine the effects of myofascial release and low -dye taping on pain in patients with

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plantar fasciitis.

Methodology:

This prospective, experimental study was conducted in accordance with the principles of good clinical practice. The protocol was approved by Ethics committee of the Janardan Rai Nagar Rajasthan Vidyapeeth University, Udaipur and written consent was obtained from all patients. The study consisted of 36 subjects, 12 in each group .Both male and female subjects participated in the study. The subjects were selected for study based on the inclusion and exclusion criteria. Inclusion criteria include:

- Subjects of age between 18-40 years.
- Gender- Both males and females.
- Clinically diagnosed cases of plantar fasciitis not less than 6 weeks.
- Heel pain maximally over plantar aspect of heel
- Pain was worst when first standing or walking after rest.
- Subjects willing to participate in the study and willing to take treatment for 10 days.
- No history of rest pain.

Exclusive criteria:

- History of any skin condition where myofascial release is contraindicated as dermatis.
- Subjects with impaired circulations to lower extremities.
- Subject with referred pain due to sciatica and neurological conditions
- Subjects with arthritis, calcaneal fracture or stress fracture of foot.
- History of lower limb surgery.
- Corticosteroids injection proceeding 3 months.
- Subjects with known tape allergies.

Eligible patients were assigned into 3 groups according to convenient sampling method.

Protocol

All subjects who met the inclusion criteria in the study were taken. A written consent was obtained and required assessment was done. For the measurement of the pain intensity, the subjects were asked to mark according to their pain intensity on the numerical pain rating scale (NPRS). Data was collected on 1st ,4th ,7th ,10th day. Subjects were placed in respective experimental groups A,B and C by according to convenient sampling method and after all evaluation, these subjects were divided into 3 groups-group A, group B, group C. Each group consisted of 12 subjects each. In group A choice of treatment was the ultrasound and calf stretching, group B was the myofascial release along with ultrasound, calf stretching and group C was the low dye taping along with ultrasound, calf stretching.10 successive days treatment was given to each group.

Procedure

Intervention of Group A

Ultrasound with output of 1w/cm2 , pulsed mode 1:4 ratio, for five minutes with frequency of 1 MHz Ask the patient to do active calf stretch in standing by leaning against the wall, holding each stretch for 1 minute and repeating 5 times each session.

Intervention of Group B

Ultrasound and calf stretching is given same as group A. Myofascial release is given in patient in prone position with feet off the end of the table. Therapist use knuckles to engage the soft tissue just anterior of calcaneus. Take up a line of tension in an anterior direction. Work progressively through to the ball of the foot as well as into deeper layers in subsequent passes and then patient lift his toe with direction - lengthen the bottom of foot by taking toes under the table toward his knee cap. Dorsiflexion can also be used in conjunction with this.

Intervention of Group C

Ultrasound and calf stretching is given same as group A. Low-dye taping is given in this group. Non-elastic adherent sports tape was used. patiens foot was be placed in a neutral position at about 90 degree of dorsiflexion and strip of tape starting at 5th MPJ was brought around heel. The tape was anchored at 1st MPJ and foot was turned medially. A second piece of tape identical to the first was taken. Same step was repeated. Full width strips were used to cover the sole of foot from the heel to the midtarsals. The tape was overlapped by half of its width and it is important that the tape strips should be laid down and not pulled so that the skin on the bottom of the foot does not wrinkle. A piece of another tape was measured which was twice the width of forefoot. Tape was placed on the top of forefoot extending from the lateral side and brought to medial side by pushing the foot in upward direction.

Home exercises: Active calf stretching was given to all the tree groups. it was performed in standing by leaning against the wall, holding each stretch for 1

minute and repeating 5times,3session per day.

Statistical analysis

SPSS version 16.0 was used for the statistical analysis. One way ANOVA test were used to determine significance of difference between group A, group B and group C. paired "t" test were done to determine significance of difference between subjects of same group (within group).A Turkey post hoc analysis was performed to interpret the findings. Level of significance selected for the study was $p<0.05$.

Results

Table 1, shows the distribution of mean value, standard deviation, F- value for intergroup analysis of age among the three groups. Group A (30.30 ± 6.45) Group B (32.70 ± 2.21) 1.121 Group C (29.60 ±4.93)1.121. Non significant difference in age was seen among the groups. Table 2, shows the within group comparison of NPRS for group A, B and C. This table highlights the group A (mean ± standard deviation) t value and p value between the 1st - 4th, 4th - 7th, 7th -10th,1st -10th which are as follow D1 (5.70 ± 0.949) - D4 (5.60 ± 0.966) 1.000 , D4 (5.60 ± 0.966) - D7 (4.90 ±1.101) 3.380 , D7 (4.90 ±1.101) - D10 (5.70 ± 0.949) 3.674 , D1 (5.70 ± 0.949) - D10 (5.70 ± 0.949) 6.332 . Non significant difference was seen between the day 1-4 but the within group analysis exhibit that there is significant difference (p and Group B the (mean ± standard deviation) t value and p value between the 1st - 4th, 4th - 7th , 7 th - 10th,1st -10th which are as follow D1 (5.60 ± 1.838) - D4 (3.50 ± 1.354) 6.678 , D4 (3.50 ± 1.354) - D7 (1.60 ±1.265) 8.143 , D7 (1.60 ±1.265) - D10 (1.60 ± 1.265) 4.025 , D1 (5.60 ± 1.838) - D10 (1.60 ± 1.265) 8.883 the within group analysis exhibit that there is significant difference. It exhibits the distribution of (mean value ± standard deviation) F- value and p - value for the intergroup analysis of NPRS on day 1 among the three groups. Group A (5.70 ± 0.95)3.396 group B (5.60 ± 1.84). 3.396 Group C (7.00 ± 1.05)3.396. Significant difference in pain was seen among the groups and the distribution of (mean value ± standard deviation) F- value and p - value for the intergroup analysis of NPRS on day 4 among the three groups. Group A (5.60 ± 0.97)6.88 group B (3.50 ± 1.35) 6.88 Group C (4.60 ± 1.43)6.88. Significant difference in pain was seen among the groups and the distribution of (mean value ± standard deviation) F- value and p - value for the intergroup analysis of NPRS on day 7 among the three groups. Group A (4.90 ± 1.10)10.081 group B (1.60 ± 1.26) 14.081 Group C (2.50 ± 1.84)14.081. Significant difference in pain was seen among the groups and the distribution of (mean value ± standard deviation) F- value and p - value for the intergroup analysis of NPRS on day 10 among the three groups. Group A (4.30 ± 0.95)39.611 group B (0.10 ± 0.32) 39.611 Group C (0.90 ± 1.66)39.611. Significant difference in pain was seen among the groups.

Table 1: Comparison of age among the groups A,B,C

Groups	MEAN±SD	F- value	Significance
Group A	30.30±6.45	1.21	NS
Group B	32.70±2.21	1.121	NS
Group C	29.60±4.93	1.121	NS

Table 2: Shows the within group comparison of NPRS for group A, B and C.

Days	Mean±SD			t-value			Significance		
	A	B	C	A	B	C	A	B	C
D1	5.70±0.949	5.60 ±1.838	7.00 ±1.054	1	6.678	7.06	NS	S	S
vs									
D4	5.60±0.966	3.50 ±1.35	4.60 ±1.430						
D4	5.60±0.966	3.50 ±1.354	4.60 ±1.430	3.28	8.143	7.584	S	S	S
vs									
D7	4.90±1.101	1.60 ±1.265	2.50 ±1.841						
D7	4.90±1.101	1.60 ±1.265	2.50 ±1.841	3.674	4.025	4.311	S	S	S
Vs									
D10	4.30±0.949	1.60 ±1.265	0.90 ±1.663						
D1	5.70±0.949	5.60 ±1.838	7.00 ±1.054	6.332	8.883	11.158	S	S	S
vs									
D10	4.30±0.949	1.60 ±1.265	0.90 ±1.663						

NS- Non Significant, S – Significant

Discussion

This study indicates was done to examine the effect of myofascial release and low dye taping in treatment of plantar fasciitis. Results showed that there was statistical Significant improvement in pain within groups and between A, B and C. this study indicates that calf stretching, ultrasound, myofascial release and low dye taping are helpful in reducing pain in plantar fasciitis though myofascial release is significantly more effective.

Effect of myofascial release along with ultrasound and calf stretching in patient with plantar fasciitis Myofascial release are helpful in reducing pain as this technique have been shown to stimulate fibroblast proliferation leading to collagen synthesis that may promote healing of plantar fasciitis by replacing degenerative tissue with stronger and more functional .[5,6] Myofascial release therapy uses hands on manipulation of the whole body to promote healing and relieving pain. The goal of myofascial release is to release fascia restriction and restore its tissue. This technique is used to ease pressure in the fibrous bands of the connective tissue or fascia. Gentle and sustained stretching of myofascial release is believed to free adhesions and softens and lengthens the fascia. By freeing up fascia that may be impending blood vessels or nerves, myofascial release is also said to enhance the body?s innate restorative powers by improving circulation and nervous system transmission. Myofascial release for changes in the myofascial structures by stretching elongation of fascial or mobilizing adhesive tissues. [3] The goal of calf stretching is to relieve the stress that put on the plantar fascia by either the plantar fascia itself being tight or fascia being tightened by tight Achilles that insert on the calcaneus. The stretching aims to reduce the contracture (tightness) of the gastrocnemius and soleus muscle, thereby reducing tension and stress on the plantar aponeurosis and stretching of the triceps surae and plantar fascia have been shown to improve range of the motion of the talocrural joint in dorsiflexion and help in the treatment of plantar fasciitis [7]. Limited dorsiflexion due to shortened calf muscles, cause greater compensatory pronation, increase the risk of the inflammation of the plantar fascia. Therefore calf muscle stretching is employed to increase the range of motion and decrease pressure on the inflamed plantar fascia. [8] Pulsed ultrasound was used in this study as it?s preferred for soft tissue repair and 1MHz was chosen as it is capable of reaching to deeper layer. Pain relief could have occurred due to the non thermal effects of pulsed ultrasound in the form of stimulation of histamine release from mast cells and factors from macrophages that accelerated the normal resolution of inflammation. Ultrasound heats tissues and tissue absorb the energy, resulting in an increase in tissue temperature and metabolism, tissue softening and increase in circulation. [9]

Effect of low dye taping along with ultrasound and calf stretching in patient with plantar fasciitis

Low dye taping is a means of controlling pain by supporting the internal structures with externally applied non-elastic adhesive tape. Low dye taping stabilizes the head of the first metatarsal during plantar flexion, provides rapid pain relief. [4]However low dye taping provides only transient support , with studies show that as little as 24 minutes of activity can decrease the effectiveness of taping significantly[10]. a significant restriction of pronation in resting calcaneal stance position was initially with the application of tape ,but was lost following 30 minutes of walking. The loss of control following exercise could be due to a reduction in the tape?s adhesion to the skin or a loss in the tensile strength of the tape. [11] The role of ultrasound and calf stretching are mentioned above. Based upon the above mentioned statement we can argue that myofascial release along with ultrasound and calf stretching showed an additional and more significant improvement as compare to low dye taping, ultrasound and calf stretching.

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Effectiveness of Therapeutic Ultrasound with Thumb Spica Splint Vs Local Steroid Injection in the Management of De Quervain's Disease

Vinod Nair

Background: De Quervain's tenosynovitis is a painful condition of the wrist which leads to difficulties in performing activities of daily living. The management of De Quervain's disease is determined more by Intuition than scientific data. The choice of first line conservative option for the management of De Quervain's disease is still a topic of debate.

Aim: To evaluate the effectiveness of therapeutic ultrasound with spica splint vs local steroid injection in the management of De Quervain's disease (DQD).

Design : Randomized controlled trial (RCT).

Setting: Outpatient department of JRN Rajasthan Vidyapeeth Physiotherapy Department OPD & and other Hospital's of Udaipur Rajasthan .

Population: sixty patients who had the history of the De Quervain's disease for at least 6 months were enrolled in the study. The ages of the patient were 30-60 year. The population included housewives, maids, painters, and teachers & workers.

Methods: Sixty patients were divided into two groups. The group 1 was treated with therapeutic ultrasound with thumb spica splitting. In (Group 2) steroid group, patients were given injection of triamcinolone mixed with 2% xylocaine into the sheath of the affected tendons, under aseptic conditions by doctors. The data was collected from the subjects through pain index, Shoulder and Hand questionnaire. The demographic data was presented in the form of tables. Intervention-induced changes within the groups were investigated using paired sample t-test while independent sample t-test was used to compare the two groups.

Results: Significant changes within both groups were observed as a result of intervention. Additionally, significant differences in some instrument items were found between experimental and control group after intervention. However, some items did not demonstrate significant changes in both groups.

Conclusion: The results showed that the use of steroid injection is an effective form of management for de Quervain's disease compare to therapeutic ultrasound and spica splint together. However this study provides evidence to the relevant clinicians and professionals on the utility of therapeutic ultrasound combined with thumb spica splint in the conservative management of DQD

Keywords: de Quervain's tenosynovitis, Wrist pain, Ultra sound, spica splint, VAS, Finkelstein's test.

De Quervain's tenosynovitis is an overuse disease that involves a thickening of the extensor retinaculum, which covers the first dorsal compartment. A case study approach was utilized in this article to demonstrate many of the available medical and occupational therapy modalities to treat this condition. De Quervain's tenosynovitis is named after Swiss surgeon Fritz de Quervain, who mentioned it in 1895 for the first time and reported a series of five cases in 1912 [3] . The condition De Quervain's disease is referred for the first time in an article which was read at the New England Surgical Society in 1936 at Bridgeport Hospital [5] . In 1989, Hoffmann published first article about the condition in American literature [4] . Considereing forearm deformities, de Quervain's is only second to trigger finger in incidence which is 20 times more common . History and clinical examination are sufficient to diagnose the disease. Presentation is usually pain at the site of radial styloid. In almost all the cases tenderness is elicited at radial side of wrist and local swelling in some cases after clinical examination. In typical cases Finkelstein's test ispositive [7].

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The Finkelstein's test is performed as the patient clenches the fist with thumb inside and ulnar deviates the hand at the same time. Patient with De Quervain's tenosynovitis feels pain at the affected site [8]. A final consensus could not be reached in the management of the disease. Non-surgical treatment modalities like rest, massage, cold and heat application, Ultra sound, splints, bracing, physical therapy, thumb spica and local corticosteroids injections have been tried with variable success. Releasing the first dorsal compartment of the wrist surgically is the final resort of treatment [11] . 91% of patients have been found to be cured with surgical management. Higher costs and complications limit the use of surgical rocedures [12] . It is in interest of patient to use non-surgical modes before going for surgical release. Efficacy of the intra-sheath injection of triamcinolone acetonide , which is a long-acting and lyophobic steroid has been mentioned in few reports for patients with snapping fingers [2, 8, 10] but very few reports describe the clinical outcomes with the same in de Quervain's disease. We describe the clinical outcomes of intra-sheath injection of steroid in the treatment of de Quervain's disease compared therapeutic ultrasound with thumb spica splint to conservative management. Objectives To compare the efficacy of local steroid injection against therapeutic ultrasound with thumb spica splint in treating de Quervain's disease.

Methods and Material Place of study:

Place of study was Outpatient department of JRN Rajasthan Vidyapeeth Physiotherapy Department OPD & and other Hospital's of Udaipur Rajasthan.

Nature of study: Prospective comparative study.

Type of Randomization: Every alternative Wrist of Dequervain' s disease was selected for a particular treatment. Overall 60 wrists with the disease were included in the study and randomized into two groups namely "therapeutic ultrasound with thumb spica splint " i.e "Group 1" and "STEROID INJECTION" i.e. "Group 2" according to the treatment they were subjected to.

❖ Ultrasound 3Mhz Pulse mode Intensity 1.5W/cm^2	
❖ Thumb spica splint - splints are applied to decrease movement and provide support and comfort through stabilization of an injury.	
❖ Steroid Injection	

On physical examination the area around the radial styloid (first dorsal compartment of wrist) was assessed for Follow up is done at 1week and 3 weeks following the treatment and patient's pain severity was assessed on the basis of VAS and any complications arising due to the treatment were noted. Ultra sound was given with phonophoresis (NSAIDS drugs) with 3Mhz head for the duration of 6 minute at intensity of 1.5 W/cm2 given for 15 days and steroid Injection Technique One ml (40mg) of Triamcinolone acetonide and 1 ml of 2% lignocaine hydrochloride was taken and mixed in 5 cc syringe and given to patient by doctors in hospital.

Table-1

Conservative (Group- 1)	Steroid Injection (Group 2)
Ultra sound was given with phonophoresis (NSAIDS) drugs with 3Mhz machine for the duration of 6 minute at intensity of 1.5 W/cm^2 in pulsed mode for 15 days.	Patients are given a dose of 40 mg of Triamcinolone or Hydrocortisone mixed with 2% Xylocaine into the tendon sheath.

The area of tenderness was confirmed before injection. The needle was passed in the first extensor compartment of wrist directing proximally towards the styloid process of radius and parallel to the abductor polices longus and extensor polices bravis tendons. Stretching of the synovial sheath by volume effect was observed.

Results A total of 60 patients participated in the study, out of which 32 were female and 28 were male patients.

Table 2: Sex distribution

	Males	Females
Group 1	16	14
Group 2	12	18

The disease is found to be common in the age group of 31-40 and 41-50 years but less common in 51-60 year. Right side is affected more often than the left, mostly due to the reason that most of the people are right handed and tend to use their right hand more frequently than the left.

Table 3: Age distribution

Age group (in years)	Group 1	Group 2
30-40	12	09
41-50	16	16
51-60	02	05

Results

14 of the 30 wrists in group 1 had complete relief of symptoms with ultra sound and Splinting treatment. Tenderness and Finkelstein test in all patients. The severity of pain was noted on Visual analogue scale, (VAS 0-10), with zero no pain, one to three as mild, and four to six as moderate and seven to 10 as severe pain. Therapeutic ultrasound with thumb spica splint vs 8 mg of triamcinolone mixed with 2% xylocaine. It was injected into the tendon sheath and advised to avoid strenuous activity for 2 days following the procedure

The 16 patients with poor to no pain relief subsequently had complete relief of symptoms with a single steroid injection. 14 of the 30 wrists which were treated with steroid injections were relieved with one injection, and the other 2 with two injections. No wrists in this group required surgical treatment.

In group 1, 14 (46.66%) had excellent, 11 (36.67%) had good and 5 (16.67%) had poor relief of pain as per Visual analogue scale. In group 2, 16 (53.33%) had excellent, 12 (40.00%) had good relief of symptoms and only 2 (06.66%) poor pain relief .

Table 4: Results

Results	Therapeutic ultrasound with thumb spica splint (Group 1)	Steroid Injection (Group 2)
Excellent	14 (46.66%)	16 (53.33%)
Good	11 (36.67%)	12 (40.00%)
Poor	5 (16.67%)	2 (06.66%)
Total	**30 (100%)**	**30 (100%)**

Discussion

In a study conducted by Richie and Eriner [14] , they concluded that local steroid injection is effective in 53% of patients while 46% of patients with ultra sound with splints only. This is in correlation to our study which showed similar results in group 2 of 53% excellent results and 46% excellent results when ultra sound with splinting is given. Injection corticosteroid was found to be effective for treatment for this disease. and physiotherapy treatment also have significant effects in treating the condition. In their analysis it was noticed that 327 wrists were injected and followed up for 9.6 months and no tendon rupture was found. Lane LB, Boretz RS, Stuchin SA [21] in their study of 249 patients observed that 76% of patients were completely relieved of pain while 7% noticed improvement of symptoms. Results were comparable and no complications were noticed. Avci et al claimed 100% success rate.15 Takuya Sawaizumi, 2007 claimed 94% success rate in their study in which they locally injected Triamcinolone for patients with De Quervain's disease. He concluded 90% of patients were fully satisfied, relapse was seen in 26% of patients, and complications were seen in 32% [16] .McDermott JD et al, reported in 2012 that at a follow up of 6 weeks, no complications were noted and 36 of the 37 wrist (97%). However 14% of wrist had recurrence of symptoms [17] This is in contrast to our study where 2 patients had recurrence of symptoms which relieved with another injection of Triamcinolone acetonide. Mohsin Mardani Kivi et al [22] conducted a prospective study over 67 patients. They injected stroid injection to all patients with and without thumb spica cast and noticed that injection and cast combination is better than injection alone. In this study they assumed that steroid inection is better than NSAID alone or casting alone or combination of NSAID and casting. They noticed successful results in 76% of patients with corticosteroid injection where as 53% of patients in our study noticed excellent results with corticosteroid injection alone. pain relief in 53% of patients with single steroid injection. They noticed local depigmentation in 8 patients compared to no such complication in our study.

Limitation:

The limitation of our study is short term follow up and small sample size Conclusion The inflammatory process occurring in DeQuervan's disease can be very effectively controlled and be cured by steroid into the tendon sheath. The result can be achieved within one or two weeks and is superior to using

Therapeutic ultrasound with thumb spica splint but in both conditions the few patient reported reoccurrence of pain.

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Effectiveness of Physiotherapy intervention in patients suffering from Head and Neck Cancer.

Shailendra Mehta

Background

Cancer is a leading health problem in India, with approximately 1 million cases occurring each year. Over 200,000 cases of head and neck cancer (HNC) occur each year in India versus 30,000 for the USA. Cancer accounts for 8% of the deaths in India.Incidence of HNC primaries has shown to increase with age. Although the functional and cosmetic deficits are very apparent in HNCs, this group of cancers accounts for only 5% of all malignancies.

Worldwide, it is considered to be the fifth most common cancer with the seventh highest cancer mortality.The most commonly listed causes of HNCs are tobacco and alcohol abuse.It is also suggested that use of alcohol in concert with smoking is among the most common etiologic factors of HNCs. Other reasons include exposure to different HNC-inducing agents, such as bethel chewing, hot tea, smoking, alcohol consumption, and human papilloma viruses

CANCER-RELATED PROBLEMS

The shoulder disability and chronic neck pain occurs following radical neck dissection. In radical neck dissection the sternocleidomastoid and omohyiod muscles, the spinal accessory nerve, the anterior, external, and internal jugular veins, and the external maxillary artery are excised, along with the lymphatic groups in the anterior and posterior triangles. In comparison, a modified radical neck procedure removes the same muscles and lymphatics and the internal jugular vein but spares the spinal accessory nerve. A functional neck dissection removes only the lymphatics and spares all muscles, nerves, and vessels.

Van Wilgen et al. found that reduced shoulder abduction, shoulder pain, and neck pain are related to several domains of quality of life (QOL) at least 1 year after surgery. Acute complications are wound infections, chyle leakage, and postoperative morbidity, such as cardiac problems and thrombosis. The most common late complications are shoulder disability, shoulder pain, reduced cervical mobility, and lymphedema.Decreased cervical range of motion (ROM), lymphedema, swallowing, mouth opening, and shoulder disability are regarded as late complications. None of these parameters appear to be related to reduced survival, but most of them are considered to be associated with reduced QOL

The purpose of this study is to investigate whether the extent of late sequelae symptoms(lymphoedema, decreased range of motion in the neck and shoulder region, speech and swallow disorders and reduced facial expression) due to radiotherapy treatment for head and neck cancer can be reduced by an individually adjusted physiotherapy effort applied immediately after the onset of and during radiotherapy treatment.

Radiotherapy induced damage of the skin, lymphatic system, cartilage and bone often leads to symptoms such as , lymphoedema, decreased range of motion of the mouth, neck and tongue, difficulty in using the mimic muscles, difficulty in swallowing and pain. The severity of late side effects due to radiotherapy treatment for head and neck cancer often leaves the patients with a poor quality of life rating.

Effects of physiotherapy interventions are scarcely investigated. Only few studies describe the effect of physiotherapy treatment. No studies have described the effects of physiotherapy intervention for patients undergoing treatment for head and neck cancer

Methodology:

50 patients in this group get the existing hospital treatment: A 10 minute instruction in mouth opening exercises by a nurse. Furthermore they receive in all 6-7 sessions of physiotherapy treatment for a 5-6 weeks period with sessions of approximately 45 minutes. 2 months after having completed radiotherapy treatment they receive a final physiotherapy treatment. The treatment consists of instruction in active and passive exercises for mouth opening, stretching exercises for the neck and shoulder region, tongue exercises, mimic exercises,

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self administered lymph drainage and softening of fibrotic tissue.

Outcome Measures

Maximum vertical dimension measured in millimetre using TheraBite "Range of Motion Scale"

Questions asked to tongue movement using questionnaire

By use of Visual Analogue Scale, measured in centimetre with one decimal

Criteria

Inclusion Criteria:

- o Patients with the clinical diagnosis of cancer cavioris or cancer oropharynges undergoing radiotherapy treatment
- o Age > 18 years
- o Informed consent

Exclusion Criteria:

- Patients who have had bone reconstruction surgery or grafting or where motor nerve damage has occurred during surgery, inflicting the function of the neck or shoulder
- Patients suffering from a known musculoskeletal disease with symptoms that may influence/disturb the picture of symptoms induced by radiotherapy to the tempora-mandibular joint, the cervical spine, shoulders (e.g R.A, fibromyalgia, arthritis,neurological disease, industrial injury)
- Patient with psychiatric diagnosis, who are unable to cooperate (including dementia)
- Patients whose general condition makes it impossible to attend the study

Sample Size

The sample size was calculated based on the mean difference between groups in change scores from baseline to postintervention on the primary outcome. The effect size was determined from the results of the pilot study, in which the mean difference between groups in the SPADI score was 14.5 with a standard deviation of 20 (effect size, 0.73). The required sample size for the study was approximately 50 participants or 25participants per group to detect a moderate to large standardized difference (effect size, 0.75) in the primary outcome.

Analysis Plan

Baseline characteristics and adverse events of the 2 groups were compared by using the independent-samples Student t test for continuous data and the Pearson chi-square test for categoric data. Primary analysis used the independent samples t test to compare change scores between groups in outcomes from baseline to postintervention. Intention-to-treat analyses were conducted on all randomized participants by using baseline-observation-carried-forward analysis. Adjusted analyses controlled for baseline values of the outcome, age, sex, cancer stage, time since surgery, neck dissection type, and pain medication use. Probability levels <.05 (2-tailed) were accepted as significant

RESULTS

A total of 50subjects participated in the study with a mean age of 47.77±11.05 suggesting middle aged mainly affected with cancer. The mean body mass index (kg/m2) of the22.56±3.10 suggesting that these females had low or near normal body mass index (BMI). The pain score was statistical significant different in all the subjects in the study with p= 0.0001.

Comparison of pre-treatment and post - treatment pain using Short form Mc gill pain Questionnaire of all subjects in the study.

Time points	Mean±SD	% of change	Paired t value	p-value
Pre treatment	6.50±2.91	56.92	9.1487	**0.0001***
Post treatment	2.80±2.06			

Level of significance: p⩽0.05

The pre- test and post- test comparison of FACT-B questionnaire showed statistical significant improvements in the physical, emotional and additional components of FACT-B questionnaire with p?0.001. However, social being and functional being components of FACT-B demonstrated no statistical significance (p=0.95 & 0.15 respectively).

The SPADI score was statistical significant in all the subjects in the study with p = 0.0001. The HADS score showed statistical significance of p=0.0001.

Comparison of pretreatment and posttreatment scores of Shoulder Pain and Disability Index (SPADI) of all the subjects in the study.

	Time points	Mean±SD	% of change	Paired t value	p-value
SPADI (%)	Pre treatment	34.00±34.76	23.31	6.4702	**0.0001**
	Post treatment	25.73±30.33			
Pain	Pre treatment	25.50±21.64	26.45	5.2765	**0.0001**
	Post treatment	18.50±19.20			
Difficulty	Pre treatment	16.00±17.56	12.46	2.1143	**0.0001**
	Post treatment	14.17±17.35			

The overall SPADI score decreased by 14.1 in the PRET group compared with a decrease of 4.8 in the TP group (adjusted: ?9.6; 95% confidence interval [95% CI], ?16.4 to ?4.5; P = .001) (Fig. 2). Scores on the Pain subscale decreased by 16.4 in the PRET group and by 2.2 in the TP group (adjusted: ?16.4; 95% CI, ?21.3 to ?4.4; P = .004) (Fig. 3). The Disability score decreased by 11.8 in the PRET group and by 7.4 in the TP group and was statistically significant after adjusting for relevant baseline variables (?9.6; 95% CI, ?13 to ?2.5; P = .005)

DISCUSSION

The major novel finding of the trial was that the physical therapy program had a beneficial effect on shoulder pain. The standardized effect represents a large effect on the percentage reduction in pain of 52% in the group exceeds the 40% to 60% reduction in pain for patient?perceived improvement. The improvement in pain was associated with increases in upper extremity strength and endurance. The findings are consistent with the hypothesis that reductions in pain may be mediated by improvements in muscular strength and endurance. It is believed that pain is secondary to trapezius muscle atrophy, which leads to the downward and lateral displacement of the scapula and droop of the shoulder. Increased strength of the scapular muscles may alleviate pain by improving the positioning of the scapula and, thus, the mechanics of the shoulder complex.

There was a significant difference in favor of physiotherapy programme for overall SPADI score. The decrease in overall pain and disability of ?9.6% in favor of the control group met the minimal clinically important difference (MCID), or the smallest difference of importance to clinicians and patients, for the SPADI scale. A significant difference in the Disability subscale score in favor of the control group also was observed after adjusting for baseline differences, suggesting greater benefit from physiotherapy programme in shoulder disability as well as pain. Positive effects of Physiotherapy were observed in both active and passive ROM. Larger effects were observed consistently in the control group, and the data suggest that even ROM may be improved to a greater degree in control group .

The PRET prescription for this study focused on strengthening the scapular muscles to optimize shoulder alignment and posture. The resistance training protocol was prescribed with the resistance weight starting at 25% to 30% of 1?RM, whereas other studies in cancer patients have prescribed resistance exercise training starting at 60% to 85% of 1?RM.22, 23 Despite the more conservative approach, the strength gains of 37% to 48% from the PRET program compare favorably with the reported gains of 30% to 45% in upper extremity strength from a previous 12?week study in breast cancer survivors.

The fact that both groups received an intervention with an exercise component allowed us to control for potential nonspecific intervention factors, such as social interaction with the therapist, expectation of benefit, and a sense of accomplishment, which may confound patient?rated outcomes in less optimally controlled trials. Other study strengths included blinded evaluation of outcomes, intention?to?treat analysis, limited loss?to?follow?up, and excellent adherence comparable to other cancer trials.

A limitation in our study was the wide range in time from surgery among participants. The results of the study may have been limited by long?term survivors with deficits refractory to TP that focused primarily on active and passive ROM and basic strengthening exercises. Further research is needed examining in specific stages in the recovery process after surgery..

In summary, the current trial demonstrated important improvements in shoulder pain and disability, upper extremity strength, and movement in HNC survivors after neck dissection. The addition of physiotherapy should be considered in the rehabilitation of HNC survivors.

CONCLUSIONS.

The Physiotherapy program significantly reduced shoulder pain and disability and improved upper extremity muscular strength and endurance in patients suffering from Head and Neck Cancer. Clinicians should consider the addition of physiotherapy in the cancer rehabilitation of postsurgical head and neck cancer patients.

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THE COMPARATIVE STUDY ON THE EFFECT OF SURYANAMASKAR AND CORE STRENGTHENING IN OBESE ADULTS

Ritu Shree Pandya* Archana Sharma**

Introduction: Overweight & obesity are common health conditions and their prevalence is increasing globally. Obese individuals expend more energy during exercise as compared to non obese. Obesity can be managed effectively by conservative means such as YOGA, Aerobics, Core strengthening exercises etc.

Objective: To compare effectiveness of Core strengthening and Suryanamaskar after some worm up exercises.

Matrial and Methods: An experimental matched subject study design to observe, the effect of eight week Suryanamaskar exercises and core training. The methods such as progressive Suryanamaskar training is given to 10 obese adults, 10 obese adult were given to core training, 10 obese adults were given combination of both and 10 obese adults were taken as control.

Data Analysis: The data was analyze using the latest SPSS (21.0) software basic analysis was done by paired t-test and dependent variables were analyzed during one way ANOVA. Statistically significant differences ($p< 0.05$) was considered significant .Multiple comparison tukey (Post Hoc Test) was applied to test for differences between pair of variables.

Results:

1. **Experimental group A (Core):** mean age (22.60), mean height (158.50) mean weight (69.00)
2. **Experimental group B (Suryanamaskar and core):** mean age (22.90), mean height (159.20), mean weight (66.80)
3. **Experimental group C (Suryanamaskar):** mean age (21.60), mean height (160.20), mean weight (66.80)
4. **Control group D (Control):** mean age (21.70), mean height (158.22), mean weight (64.70).

Conclusion: All groups showed improvement following 8 week of training protocol, there is significant effect in improving muscle strength, weight loss, flexibility and cardiovascular endurance was seen in Core and SN group.

Key words: obesity, core exercise, suryanamaskar.

INTRODUCTION

Overweight & obesity are common health conditions and their prevalence is increasing globally. Obesity comes with several causes which make obesity management more complex. Obese individuals expend more energy during exercise as compared to non-obese. Physical activity or exercise are commonly included as component of lifestyle intervention for health benefit.

Yoga is an ancient Indian form of physical activity which may assist in achieving recommended levels of fitness. (Komal A Jakhotia et.,al 2015).

Yoga is believed to be 4000-8000 year old with its origin in Indus valley civilization. India has rich tradition of yogic practice. Off lately due to scientific evidence indicating the efficacy of the various Yoga asanas, the practice of Yoga is gaining a lot of attention from health care professionals across the globe. This has also opened avenues for further research on the therapeutic aspects of Yoga asanas. (Gauri Shankar et.,al 2011)

Yoga is an ancient Indian form of physical activity which may assist in achieving recommended levels of fitness. (Komal A Jakhotia et.,al 2015).

Suryanamaskar (SN) is a part of Yoga. It is a set of sequential yogic postures which are called as asanas. A review by Ross et al. Suggests that Yoga may be equally effective or better than exercise at

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improving a variety of health-related outcome measures like blood glucose, blood lipids and oxidative stress. Suryanamaskar is a branch of yoga that concentrates on physical health and mental being well. Suryanamaskar - the salutation to the God "SUN" is a set of sequential yogic posture/Asanas (Gauri Shankar, 2011). Suryanamaskar is a set of 12 Asanas (postures), it is done preferably in the morning while facing the rising sun.

The "core" has been described as a box with the abdominals in the front, Para spinals and gluteals in the back, the diaphragm as the roof, and the pelvic floor and hip girdle musculature as the bottom. (Aashima Dattaet al.,2014). Researchers have described the core as being a "power-house" for initiating limb movement (Akuthota & Nadler, 2004) or as a double-walled cylinder or box (Richardson et al., 1999). Through its ability to contract, the core musculature creates a foundation for the naturally stable spine, and allows for the transfer of forces between body segments during dynamic movements (Briggs et al., 2004; Essendrop & Schibye, 2004; Faries & Greenwood, 2007; Hodges, Holm, Holm, Ekstrom, Cresswell, Hansson, & Thorstensson, 2003; Stanford, 2002). According to Briggs et al. (2004), spinal stability is needed for the production of movement and relies on the musculature of the core to possess adequate strength, power, and endurance.

Core training is an essential rehabilitation protocol. Core training is the combination of lumbar stabilization and motor control training to maintain functional stability. Core training has been promoted as a preventive regime as a form of rehabilitation and as a performance.

Procedure

Subjects were recruited from Guru Nanak University campus only obese adults were taken who reported to the physiotherapy department, were screened after finding their suitability as per in the inclusion and exclusion criteria's and then they were requested to participate in the study were briefed about the nature of the study and the interventions. After briefing, their informed written consent was taken. Their demographic data were collected. Participating subjects were evaluated in details for the study needs with special emphasis on four positive sings out of the test such as Sit and reach test, 12 min walk test, Bio feedback stabilizer, Bench press test.

After these, 40 subjects were allocated to four groups, experimental Group A(CORE),Group B(SN+C), Group C(SN) and Group D(CONTROL).

Tools Used:

- Measuring Height - Anthropometric rod.
- Measuring Weight - weighing machine.
- Body mass index (BMI) derived.
- Upper limb muscle strength measured by Bench press test.
- Lower limb muscle strength measured by 1 min push up test.
- Core stability measured by modified double leg lowering test (Biofeed back stabilizer).
- Endurance measured by 12 minute walk/run test.
- Flexibility measured by Sit and reach test.

Inclusion criteria

- Age group - 18 to 40 years.
- Obese female were included for this study.
- Only healthy subjects with no history of injury to the lower extremities in the past two years were included.
- The subjects who agreed to co-operate throughout the course of the study were included.

Exclusion criteria

- Male obes.
- Recent history of musculoskeletal injury.
- Participating in any other study.
- Any psychological ailment.
- Any balance and co-ordination problems.
- History of surgery on the lower extremity or back in the past two years.
- Evidence of any deformity, ligament laxity of the lower extremity.

Statistical Analysis

The data was statistically analyzed using statistical package for social science (SPSSY)/17.0 statistical test used in the present study were ANOVA TEST, POST-HOC TEST. The significance level are set as 0.05 level.

The ANOVA test were used to compare differences between two or more groups flexibility by sit and reach test, cardiovascular endurance by copper test, upper and lower extremity test by push up test and sit up test, lumbopelvic stability by MDSLL, test before and after the protocol with four groups.

Results

Suryanamaskar training program increase physical performance variable such as muscle strength, endurance, Flexibility and Weight loss on other hand core training program enhance muscle strength, Flexibility, Core stability and endurance.

DISCUSSION

The aim of the study was to do a comparison between the effect of suryanamaskar and core training protocol on physical performance variables in obese adults.

1. FLEXIBLITY

The results of our study showed that flexibility was improved in all four groups of obese people being trained with core (t= 3.498, p=0.0007), Suryanamaskar (t=16.282, p= 0.000) and in group C (core + SN) (t= 9.498, p=0.000) in comparison to control group (t=0.177, p=0.000). Flexiblity was tested with Sit and Reach test. A significant increase in all four groups was observed (f=1.392, p=0.000).

2. CORE STRENGTHENING

The results our study showed that core strengthening improved in all four groups of obese people being trained with core (t= 9.000, p=0.0000), Suryanamaskar (t=5.014, p= 0.001) and in group C(core + SN)(t= 9.000, p=0.000) in comparison to control group (t=5.014, p=0.001). Core strengthing was tested by Bio feedback stabilizer. A significant increase in all four groups was observed (f=1.429, p=0.678)..

3. ENDURANCE STRENGTHENING

The results of our study showed that endurance improved in all four groups of obese people being trained with core (t= -7.037, p=0.0001), suryanamaskar (t=-6.125, p= 0.001) and in group C (core + SN) (t= -7.333, p=0.001) in comparison to control group (t=5.014, p=0.001). Endurance was tested by 12 minute walk or run test .A significant increase in all four group was observed (f=0.259, p=0.854). The study was conducted by (W. vinu et.al 2015) to find the effect of yogic practices on cardio respiratory endurance of the obese adolescents". The findings of the study suggested that cardio-respiratory endurance, has significantly improved in yogic practice group. The results of the study in yoga practices groups showed significant improvement in, cardio respiratory endurance when compared with a control group as well as pre test.

4. WEIGHT

The results of our study showed that weight improved in both grouped (group B+C) of obese adults suryanamaskar (t=-4.538, p= 0.001) and in group C (core + SN) (t= -4.919, p=0.001) in comparison to control group. Weight was tested by weighing machine. A significant increase in all four group was observed (f=2.205, p=0.104)

5. MUSCLE STRENGTH

Muscle strength can be divided into upper body and lower body:

For upper body strength.

The results of our study showed that upper body muscle strength was improved in all four groups (group B+C) of obese adults suryanamaskar (t=-4.538, p= 0.001) and in group C (core + SN) (t= -4.919, p=0.001) in comparison to control group. Upper body muscle strength was tested by push up test. A significant increase in all four group was observed (f=2.205, p=0.104).

For lower body strength

The results of our study showed that lower body improved in all groups (group B+C) of obese adults suryanamaskar (t=-7.800, p= 0.000) and in group C (core + SN) (t= -1.019, p=0.335) in comparison to control group (t=2.348,p=0.043). Lower body muscle strength was tested by sit up test. A significant increase in all four group was found (f=4.732, p=0.008).

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