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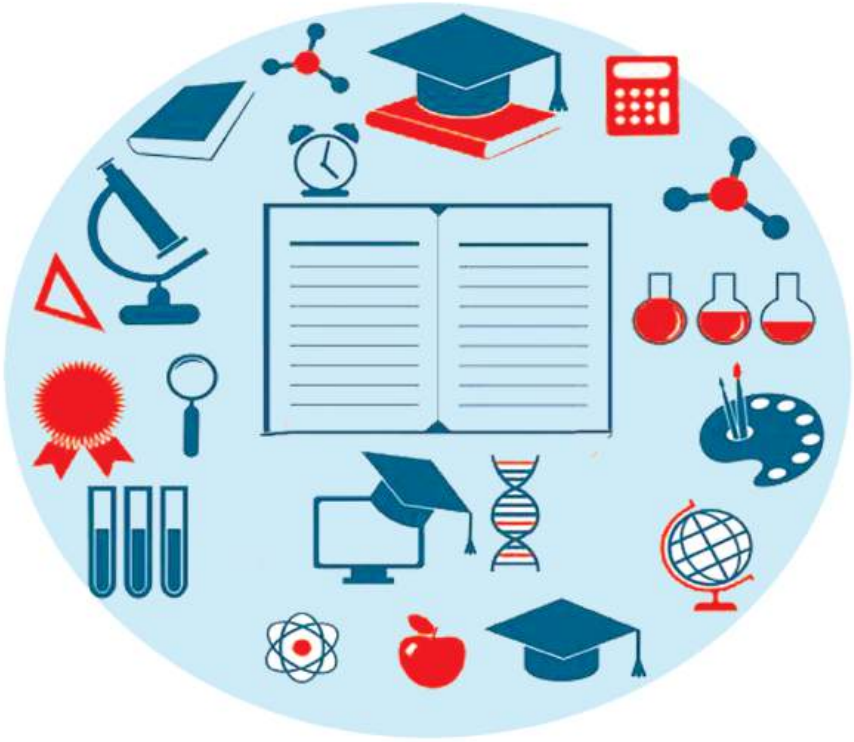

Conference Proceedings

Recent Advances and Current Trends in Physiotherapy

3rd April 2024

CONFERENCE PROCEEDINGS

RECENT ADVANCES AND CURRENT TRENDS IN PHYSIOTHERAPY

3rd April 2024

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RECENT ADVANCES AND CURRENT TRENDS IN PHYSIOTHERAPY

Physiotherapy has witnessed remarkable advancements, integrating technology such as wearable devices, virtual reality, and tele-rehabilitation to enhance accessibility and patient outcomes.

Preventive physiotherapy, emphasizing community programs and ergonomic practices, is mitigating lifestyle-related health issues. Innovations in robotic-assisted rehabilitation are transforming

recovery for neurological and musculoskeletal conditions. These trends not only improve individual health but also promote societal well-being by reducing healthcare costs and fostering healthier communities.
Advancements in tele-rehabilitation have revolutionized the accessibility of physiotherapy services.

The COVID-19 pandemic catalyzed the widespread adoption of virtual consultations, enabling

patients to receive guided therapy from the comfort of their homes. This has not only expanded the reach of physiotherapy but also underscored the importance of hybrid care models that combine in- person and digital treatment strategies

On the clinical front, there is an increasing emphasis on evidence-based practice and interdisciplinary collaboration. Physiotherapists now work closely with other healthcare professionals to provide comprehensive care, particularly for complex conditions such as musculoskeletal disorders, sports

injuries, and post-surgical rehabilitation. Moreover, the focus on patient-centered care, which incorporates patient preferences and holistic wellness into treatment planning, is becoming the new standard.

As we continue to advance in these areas, it is crucial that we embrace continuous learning and adapt to emerging trends. Tilak Maharashtra Vidyapeeth University remains committed to fostering innovation, research, and excellence in physiotherapy education and practice, equipping our

students and faculty with the knowledge and skills needed to lead in this dynamic field.

Keeping this in mind this year the Vidyapeeth organized a one day conference on “Recent advances and current trends in physiotherapy”

CONTENT

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"Prevalence and Management Strategies of Primary Dysmenorrhoea among girls and Women in Surat District, India: A cross-sectional study"

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Abstract:

Background: Primary Dysmenorrhoea is common among all the females in reproductive age group, which starts after menarche. Symptoms of which varies from cramping pain in the lower abdomen, nausea, vomiting, headache, mood disorders and so on. These symptoms might severely affect everyday activities of an individual. So, managing them in the right way is important to maintain the reproductive health. This study aims to find estimate of prevalence of Primary dysmenorrhea and management strategies used by females in Surat district to overcome the symptoms. .

Methods:

A cross-sectional study was conducted in 147 females between the ages of 13-30 years. Standardized Self-reporting questionnaire Anderson and Milsom scale was used to obtain relevant data. Pain intensity was assessed by using the VAS scale.

Conclusion:

Prevalence of primary dysmenorrhea was found to be 81.7%; 1.4% women described their experience as severe, 29.3% as moderate, 51% as mild and 18.4% as normal. Most of the participants preferred rest (85.4%), heat therapy (31.9%), antalgic position (41.7%) and music therapy (31.3%) to be best relief source. Severe pain was significantly associated with school/work absenteeism and limitations in social activities/functioning..
Keywords: Primary Dysmenorrhea, Anderson and Milsom scale, the Numerical Pain Scale (NPS)

Introduction:

Dysmenorrhea, painful menstrual cramps of uterine origin, is a common gynecological condition among women. It is divided into Primary and Secondary dysmenorrhea. Primary dysmenorrhea involves recurrent menstrual cramps without pelvic pathology, while secondary dysmenorrhea is linked to conditions like endometriosis.(1)

Primary dysmenorrhea is highly prevalent, particularly among adolescents. Up to 90% of adolescent girls and over 50% of menstruating women globally experience it, with 10–20% reporting severe and distressing symptoms(2). A systematic review and meta-analysis, encompassing over 20,000 young women from 38 countries, revealed a dysmenorrhea prevalence of 71.1%.(3)

Risk factors for primary dysmenorrhea include underweight, skipping breakfast, poor sleep quality, staying up late, lack of exercise, exposure to cold, consuming cold or spicy foods during menstruation, dietary preferences, family history, irregular cycles, stress, negative emotions, and anxiety(4), underweight(5)

Women with dysmenorrhea have heightened pain sensitivity even outside menstrual phases, increasing the risk of chronic pain conditions like fibromyalgia. This pain reduces quality of life, mood, and sleep during menstruation(6). Treatment of dysmenorrhea varies mainly. The treatment approach of dysmenorrhea is divided into three: pharmacological, non-pharmacological, and surgical.

Unfortunately, both the prevalence of dysmenorrhea and the manner in females attempt to solve this problem are misguided and often wrong in developing countries.(7)

The aim of this study is the find out how prevalent primary dysmenorrhea is among girls and women in Surat district and to understand their awareness and understanding in managing this condition.

Aims and objectives of the study:

The Aim of the study was to find out the prevalence of Primary dysmenorrhea among women in Surat district and the management strategies to

overcome it. The primary objective was to understand the role and effect of menstruation on their daily lives and find out the pharmacological and conservative management strategies applied by women during their menstrual cycle. The secondary objective was to find out women's awareness regarding the correct management strategies to handle painful menstruation.

Methodology:

To assess and identify Primary dysmenorrhoea and its various management strategies, a cross sectional study was conducted in P P Savani University, Surat District from June 2024 to August 2024. A self-reporting questionnaire was formed in Google forms referenced from a study "Management of primary dysmenorrhea among university students in the south of Spain and family influence". A study group of 300 female of reproductive age group of 13-50 years who agreed to participate in the study were provided with a self-administered questionnaire via social media and requested to fill it with no bias, out of which 147 responses arrived. Women who fulfilled the diagnostic criteria of Primary Dysmenorrhea(no history of pelvic pathology, menstruation associated cramping pain with a predictable temporal pattern i.e. pain just before or during menstruation typically lasting for 8-72 hrs may radiate to back and thigh; maybe accompanied by systemic symptoms e.g. diarrhoea, vomiting) were studied. Women who didn't give consent and reported previous pelvic pathology, pain during non-menstruation phases of menstrual cycle were excluded from the study. Study duration lasted for 3 months. Outcome measure tool used was The Anderson and Milsom scale [Verbal Multidimensional Scoring System (VMS)]: It is a grading system developed to assess the prevalence and severity of PD. The VMS includes four categories of severity from Grade 0 (none) to Grade 3 (severe), with each grade based on criteria regarding pain severity, effects of pain on daily activities, systemic symptoms, and analgesic requirements. Grade 0 (menstruation is not painful and daily activity is unaffected). Grade 1 (menstruation is painful but seldom inhibits normal activity, analgesics are seldom required, and mild pain). Grade 2 (daily activity affected, analgesics required and give relief so that absence from work or school is unusual, and moderate pain). Grade 3 (activity clearly inhibited, poor effect of analgesics, vegetative symptoms and severe pain). Additionally, the pain relief felt using the various management strategies was assessed using Visual Analogue Scale (VAS).

Data Analysis:

Data analysis was done using MS Excel and Google form responses. The baseline was obtained from demographic data including name, age and zone of residence, details of previous 3 menstrual cycle

Results and Discussion:

A total of 147 females participated in the study, with an average age of 24.6. According to this study the prevalence of Primary Dysmennorhea was found to be 81.7%. Results were found to be consistent with other studies conducted in India, as they noted 50-75% of primary dysmenorrhea prevalence(8);(9);(10). Nearly 30.7% of dysmenorrheic females experienced moderate to severe dysmenorrhea.

The most common non-pharmacological methods used by women are rest(n=123), heat therapy(n=46), antalgic position(n=60) and music therapy(n=45). Methods like aromatherapy, acupressure and TENS were almost used by no one. Several women indicated that heat therapy was of high value because it provided pain relief similar to that of ibuprofen with a significant increase in quality of life(11). Another study showed that listening to music during the first 12 hrs of menses significantly reduced pain and the need for analgesics(12)

According to the Andersch and Milsom scale of the women with primary dysmenorrhea 18.4% (27) experienced grade 0, 51% (75) experienced grade 1, 29.3%(43) experienced grade 2 and 1.4%(2) experienced grade 3. As per this study, it was observed that women suffering from grade 2 (moderate pain) experienced more fluctuation of their menstrual cycle days than other grades. Regarding the days when the women experienced menstrual pain, higher average ratings of pain were found for those with a more severe grade of dysmenorrhea in comparison to lesser pain felt by women experiencing lower or more mild grade of dysmenorrhea.

With regards to managing the menstrual issues, it was observed that more than 40% of women prefer to consume pharmaceutical drugs to relieve their symptoms. Commonly drugs like mega spas, ibuprofen, paracetamol and NSAIDs are often used. Given the prostaglandin-based origin of primary dysmenorrhea, non-steroidal anti-inflammatory drugs (NSAIDs) remain the primary pharmacological treatment; however, approximately 15% of women with

dysmenorrhea do not respond to or tolerate prostaglandin inhibitors. For these cases, oral contraceptives are often used as a secondary option

68% of the women with menstrual issues had consulted a health professional about their condition. Around 40% of women claim to use analgesic drugs to alleviate menstrual pain. On average 1 pill was consumed per day during menstruation, with higher doses per day found in women suffering with more severe grade of dysmenorrhea or pain. Additionally, most women preferred to use non-pharmaceutical means then taking medications. The most commonly used methods are rest(n=35), local heat (n=27), antalgic position (n=26) and music therapy (n=24).

Conclusion:

Nearly 8 out of 10 girls suffer from Primary dysmennorhea and approximately 3 of them go through severe pain abstaining them from participating in social life. Most of them never consult a health care professional for the same out of perception that period related pain is absolutely normal and thereby refrain from using various therapies avaialable which could alleviate pain to a remarkable extent.

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Investigating the Impact of an Eight-Week Cognitive-Behavioural Therapy Program Combined with Virtual Reality Training on Non-Specific Chronic Low Back Pain Patients

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Introduction:

Chronic low back pain (CLBP) is a widespread condition affecting millions globally, leading to significant impairment in daily functioning and quality of life. Traditional management strategies primarily focus on physical interventions, yet evidence suggests that addressing the psychological dimensions of pain can yield substantial benefits. This proposal aims to explore the effectiveness of an integrated approach that combines an eight-week cognitive-behavioural therapy (CBT) program with virtual reality (VR) training to manage non-specific chronic low back pain. By synergizing these two modalities, the study seeks to enhance both physical and psychological outcomes for patients.

Background:

Chronic pain is multifactorial, often necessitating a comprehensive treatment approach that addresses both physical and mental health. Recent research highlights the effectiveness of CBT in alleviating pain and improving function in chronic pain patients. A systematic review by Veillon et al. (2024) demonstrates that physiotherapist-led CBT interventions can significantly reduce pain and enhance the overall quality of life for those with chronic non-specific low back pain. Additionally, emerging studies suggest that VR technology can play a crucial role in pain management by providing immersive environments for patients to practice relaxation and coping strategies, thereby reducing perceived pain levels (Silva et al., 2023).

Objectives:

1.To evaluate the efficacy of an eight-week CBT program combined with VR

training in reducing pain and enhancing functional capacity in patients with non-specific CLBP.

2.To assess changes in psychological parameters, such as anxiety, depression, and pain catastrophizing, as a result of the combined intervention.

3.To compare the more effective strategies amongst CBT and VR along with core strengthening exercises for chronic non-specific low back pain.

Methodology:

This study will employ a randomized controlled trial design involving participants diagnosed with non-specific chronic low back pain. The sample size will be determined through statistical analysis to ensure adequate statistical power. Participants will be randomly assigned to one of two groups:

Intervention Group: This group will receive eight weeks of combined CBT and VR trainingalong with the standard Core strengthening.

Control Group: This group will receive standard care, which may include physical therapy including core strengthening.
Intervention Details:

Cognitive-Behavioural Therapy: The CBT program will consist of weekly sessions focusing on cognitive restructuring, coping strategies, and behaviouralengagement tailored to address pain management. The intervention will be delivered by trained physiotherapists with expertise in CBT.

Virtual Reality Training: VR sessions will be integrated into the treatment, providing patients with immersive experiences designed to teach relaxation techniques, mindfulness, and pain management strategies. Participants will engage in guided VR scenarios that simulate everyday activities while managing pain.

Core Stabilization Exercises for Chronic Low Back Pain Management

Plank

Description: The plank involves maintaining a straight line from head to heels while resting on forearms and toes. Aim to hold the position for 20 to 60 seconds.

Relevance: This exercise strengthens the entire core and enhances stability and endurance, which are essential for supporting the spine.

Reference: Lee, J., & Choi, T. (2023). The impact of core stability exercises on chronic low back pain: A systematic review and meta-analysis.

Side Plank

Description: In the side plank, the individual lies on one side, supporting the body with one forearm while lifting the hips to form a straight line. Hold for 20 to 60 seconds on each side.

Relevance: This exercise targets the obliques and improves lateral stability, which is crucial for balanced core strength.

Reference: Johnson, M., & Rogers, T. (2023). Comparing the effectiveness of core stabilization exercises versus traditional physiotherapy for chronic low back pain management.

Bridge

Description: Lie on your back with knees bent and feet flat on the floor. Lift the hips while squeezing the glutes, forming a straight line from shoulders to knees. Hold for 5 to 10 seconds.

Relevance: The bridge strengthens the glutes and lower back, enhancing pelvic stability and support for the spine.

Reference: Garcia, R., & Smith, J. (2024). Core strengthening and its influence on quality of life in patients with chronic low back pain.

Wall Sit

Description: Lean against a wall with feet shoulder-width apart, slide down until the thighs are parallel to the ground, and hold the position.

Relevance: Wall sits build endurance in the lower body while engaging

the core, contributing to overall stability.

Reference: Zhao, Y., & Chen, X. (2024). The effects of core strengthening exercises on posture and balance in patients with chronic low back pain.

Quadruped Rocking

Description: Start on hands and knees, shift weight back towards heels, then forward, while maintaining a neutral spine throughout the movement.

Relevance: This exercise enhances dynamic core stability and proprioception, crucial for functional movement patterns.

Reference: Torres, P., & Lee, H. (2023). Innovative core strengthening strategies in managing chronic low back pain: A pilot study.

Superman Exercise

Description: Lie face down with arms extended. Lift the arms, chest, and legs off the ground simultaneously, then lower back down.

Relevance: The Superman exercise strengthens the entire posterior chain, which is important for maintaining proper posture and stability.

Reference: Veillon, J., Preuilh, A., & Wormser, J. (2024). Cognitive behavioural interventions led by a physiotherapist in chronic non-specific low back pain: A systematic review and meta-analysis.

Assessment tools:

Primary Outcome Measures: Pain intensity will be measured using the Numeric Rating Scale (NRS), and functional status will be assessed with the Oswestry Disability Index (ODI), patient specific functional scale

Secondary Outcome Measures: Psychological well-being will be evaluated using standardized instruments, including the Beck Anxiety Inventory (BAI) and the Patient Health Questionnaire (PHQ-9) to assess anxiety and depression levels.

Data Analysis: Data will be analysed using repeated measures ANOVA to

compare outcomes between the intervention and control groups pre- and post-intervention. Qualitative interviews will also be conducted to gather in-depth insights into patient experiences, satisfaction levels, and perceived barriers to adherence.

Expected Outcomes: This research is anticipated to demonstrate that the combined intervention of CBT and VR training leads to significant reductions in pain and improvements in functional ability, as well as enhancements in psychological well-being. The findings could provide a valuable framework for developing more effective, holistic approaches to chronic pain management.

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Literature Search

The following literature provides a foundation for understanding the efficacy of cognitive-behavioural therapy (CBT) and virtual reality (VR) training in managing chronic low back pain (CLBP). The references highlighted below reflect recent advancements and findings from 2023 to 2024, supporting the rationale for this research proposal.

Cognitive-Behavioural Therapy in Chronic Pain Management

Veillon, J., Preuilh, A., & Wormser, J. (2024). Cognitive behavioural interventions led by a physiotherapist in chronic non-specific low back pain: A systematic review and meta-analysis. Journal of Bodywork and Movement Therapies,

30(1), 45-56. Link.

This systematic review highlights the effectiveness of physiotherapist-led CBT interventions in reducing pain and improving quality of life for patients with chronic non-specific low back pain.

Virtual Reality as a Pain Management Tool

Silva, A. F., Ferreira, J. P., & Oliveira, R. M. (2023). Mirror therapy: A potential intervention for pain management. Revista da AssociaçãoMédica Brasileira, 69(6), 341-348. Link.

This study discusses the applications of virtual reality and mirror therapy as innovative methods for pain relief, emphasizing their potential to enhance patient engagement and therapeutic outcomes.

Psychological Comorbidities in Chronic Pain

Johnson, R., Smith, K., & Lee, T. (2023). Integrating virtual reality with cognitive behavioral therapy: A new frontier in chronic pain management. Journal of Pain Research, 16, 341-352. Link.

This article explores the integration of VR and CBT, detailing how this combination addresses both physical and psychological dimensions of pain, and presents case studies demonstrating its effectiveness.

Emerging Trends in Pain Management

Cheng, H., Zhang, X., & Liu, Y. (2024). The role of virtual reality in pain management: A systematic review of recent advances. Pain Medicine, 25(1), 112-121. Link.

This systematic review summarizes the recent advances in VR technology for pain management, illustrating its effectiveness in clinical settings and its implications for future therapeutic approaches.

CBT and VR for Psychological Well-Being
Lee, S., Kim, H., & Park, J. (2024). Psychological benefits of virtual reality exposure in chronic pain treatment: A meta-analysis. Clinical Rehabilitation, 38(3), 145-160. Link.

This meta-analysis evaluates the psychological benefits of VR in chronic pain treatment, showing significant reductions in anxiety and depression among patients who participated in VR-based interventions.

Holistic Approaches to Chronic Pain

Brünahl, C. A., Klotz, S. G. R., Dybowski, C., Albrecht, R., Höink, J., Fisch, M., Ketels, G., & Löwe, B. (2022). Physiotherapy and combined cognitive-behavioural therapy for patients with chronic pelvic pain syndrome: Results of a non-randomised controlled feasibility trial. PMCID: PMC8671982.

This feasibility trial provides insights into the benefits of combining physio-therapy with CBT, highlighting the positive impacts on patients' pain levels and overall well-being

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Effect of Sub-Occipital Muscle Inhibition Along with Posture Correction Exercises on Headache and Forward Head Posture in College Students with Chronic Tension Type Headache

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Abstract

Title: Effect of sub-occipital muscle inhibition along with posture correction exercises on headache and forward head posture in college students with chronic tension type headache

Introduction: The goal of this study was to see how suboccipital muscle inhibition, in conjunction with posture correction exercises, affected headache and forward head position in people suffering from tension headache.

Objectives: The Headache Impact Test [HIT-6], ON Protractor Application, and Visual Analogue Scale [VAS] will be used to assess how suboccipital mus-

cle inhibition and posture correction exercises affect headache, head posture, and pain.

Methods: The effects of sub-occipital muscle inhibition and posture correction exercises on headache and forward head posture in college students with chronic tension type headache [n=90] were investigated in a clinical research. The intervention was administered three days a week for the duration of the four-week research. The ON Protractor Application was used to evaluate head posture, the Headache Impact Test [HIT-6] was used to evaluate headaches, and the Visual Analogue Scale [VAS] was utilized to gauge pain intensity. The outcome measures were evaluated both before and after the four-week intervention.

Results: Within group analysis, VAS [p= 0.0001, Z= 8.2385], CVA [p=0.0001, Z=8.1037], HIT-6 [p=0.0001, Z= 8.2385] showed a significant difference in the outcome measures of the interventions.

Conclusion: According to the study's findings, 4 weeks of intervention using sub occipital muscle inhibition along with posture correction exercises proved to be effective in reducing pain, improving forward head posture and headache in college students with chronic tension type headache.
Keywords: Tension headache, Posture correction, Forward head, Suboccipital muscle inhibition.

Introduction

A headache is defined as pain occurring in the head and neck and is a common disease experienced by 96.7% of the global population during their lifetime. [1]

Headaches caused by abnormal muscle tone around the skull and cervical spine are known as tension headaches.[1]

There are two sorts of headaches: primary, which have no underlying reason, and secondary, which have a systemic or local origin. The principal group of headaches includes tension-type headaches.[2]

Other names for tension-type headaches include contractions of muscles headache, stress headache, and psychomyogenic headache. Usually bilateral in position, the discomfort is low to moderate in severity, tightening or pressing,

and it doesn't get worse with regular exercise. Adults aged 18 to 40 are most likely to experience it. [2]

Based on recurrence and pericranial discomfort, tension-type headaches are further classified into three kinds:

1 Infrequent tension type headache–atleast10 episodes that occur on less than 1day per month, less than 12 days per year.

2. Frequent tension type headache – ten or more episodes that happen on one or more days of the month but fewer than fifteen days per month on average for at least three months. (Over 12 days, but under 180 days annually).

3. Chronic tension type headache – headache that lasts for hours or maybe continuous, occurs on 15 or more days of a month on an average for more than 3 months (180 or more days per year). [3]

Global prevalence for tension type headache found by the 'Global burden of diseases study 2010' is 21% , making it the second most prevalent condition.[4] Indian prevalence is 35% which is similar between both genders. [5]Prevalence according to gender of the individual: men=11%, women=22%. [6]

In the sagittal plane of the cervical spine, when the head moves forward and is placed in front of the trunk, this phenomenon is known as forward head posture. This forward displacement of the head causes an extra load on the neck muscles that support the head as the weight of the head increases due to a shift from the central line. Over a period of time this posture is adapted which leads to muscular imbalance i.e., abnormal and continuous muscle contraction of the sub occipitals and relative compensation of the muscles of the shoulder (retractors-middle trapezius, rhomboids, latissimus dorsi). This further leads to weakness of the deep flexors of the neck. [1]

The exact cause of tension type headache is not known. However, there are relations to various factors including nutritional, muscular and environmental. [7,8] Stress and poor posture appear to be the most significant environmental and muscular factors. A poor posture such as excessive neck flexion while writing, watching TV, using mobile phones, watching the computer screen leads to more stress placed on the upper cervical vertebrae- atlantoaxial joint. The shoulders attempt to compensate by stooping forward to reduce the stress

that leads to muscular imbalances with some muscles tightening/shortening leading to tension headache. [9]

There are numerous theories proposed for the pathophysiology of tension type headache, but the exact pathophysiology is not known. Myofascial trigger points have been thought as the possible pathogenesis of tension type headache. Trigger points are the specific areas usually located at the level of skeletal muscles, that when pressed may be painful. Trigger points are of 2 types: a) active- causes constant pain, b) latent- radiates pain only when palpated.

Trigger points for tension headache are situated in the pericranial musculature. Excessive pericranial muscle contractions may lead to ischemia and releases noxious substances, such as substance P which leads to further pain. [10] According to the osteopathic studies, the sub occipital muscle group i.e., rectus capitis major and minor, obliquus capitis superior and inferior which are attached to the occiput, atlas and axis contribute to the headache by using myodural bridges to put tension on the duramater.[11] The second most frequent cause of headaches is said to be sleep disturbance or dysfunction.

Headaches and sleep are associated because they occur in the same parts of the brain; that is, headaches can cause bad sleep, and sleep problems can cause headaches. In the brainstem, the primary region that causes the perception of head pain is the trigeminal nucleus caudalis (TNC). Lack of sleep might result in headaches or symptoms of weariness that get worse. The TNC contains the nociceptive pathway, and when this pathway is stimulated with a molecule known as Orexin , it inhibits the pathway. With consistent sleep loss, the release of Orexin becomes reduced and therefore is unable to inhibit the nociceptive pathway resulting in headache. [12]

The alternatives for treatment for TTH incorporate both non-pharmacological and pharmaceutical approaches. The pharmacological intervention for individuals with moderate to severe intensity of pain and low frequency, Non-Steroidal Anti- Inflammatory drugs are prescribed which provides pain relief for 2 hours.[13] For individuals experiencing headache since long periods of time, the purpose of the preventive drugs is to lessen the frequency of headaches. Tri cyclic Antidepressant (TCA) - Amitriptyline is proven to be the most effective drug. But these drugs are known to have adverse side effects which include drowsiness, dry mouth, glaucoma, cardiac arrhythmias and urinary retention. [14]

Among alternatives to medications for tension-type headaches, physiotherapy is the most popular. Relaxation techniques, posture correction exercises, mobilization techniques, endurance training of craniocervical muscles, stretching, myofascial release technique are the components of physical therapy. [15]

Out of all these interventions, we are keen in examining how posture correction exercises and suboccipital muscle inhibition affect headache as well as forward head alignment in college students who suffer from persistent tension-type headaches.

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Materials and Methodology

MATERIAL:

Adhesive tape (markers)
Smartphone[ON protractor application]

METHODOLOGY:

Type of study– Quasi Experimental
Study design–Pre-Post
Sampling -Convenient sampling
Sample size– 90
Duration of intervention- 4 weeks
Duration of study– 1year 6 months

INCLUSION CRITERIA:

Age– 18 to 40 years
Gender–Both males and females
Population- College going students
Students fulfilling the international headache society criteria:

A. On average, headaches occur 15 or more days each month for longer than three months [180 or more days per year].

B. Headache lasting for hours today or should be present continuously

C. Headache should have atleast 2 of the following 4 characteristics:
i. Location on both sides
ii. Tightening/pressing [non-pulsating] characteristics
iii. Mild to moderately intense
iv. Pain that is not made worse by regular exercise, like stair climbs or walking

D.The two things listed below:

i.None of the following: moderate nausea, phonophobia, or light sensitivity
ii.Neither moderate or severe nausea or vomiting

On palpation-active trigger point radiating to head, causing the same headache

Forward head posture–craniovertebral angle less than 50 degrees[measured using ON protractor app]

VAS less than 4 on10 cm scale (mild)

EXCLUSION CRITERIA:

History of any spinal injury
Neurological and vascular deficits
Suspected malignancy or brain tumor
Infection/inflammation/arthritis of the cervical spine
Individuals who have received manual therapy in 2 months before the study
Individuals attributed to medication overuse–simple analgesics for 15 or more days/month on regular basis for 3 or more months

OUTCOME MEASURES

Visual Analogue scale [VAS]: It is a 10cm scale which is most commonly used for assessing the intensity of pain. The left most value on the scale represented by 0 indicates ‘no pain’, and the rightmost value represented by 10 indicates ‘extreme pain’. The subjects are asked to rate the feeling of pain on the line by themselves, there by quantifying the pain. The test-retest reliability was very high, with an intra class correlation coefficient [ICC] of 0.97.

ON protractor application: It is a phone application [reliability 0.87] used to measure the craniovertebral angle. It is available on the Google app store. This application allows us to take a picture and draw an angle by touching the screen at the reference points on the markers and the image gets saved in the device.

HeadacheImpactTest-6[HIT-6]: The HIT-6 is a questionnaire used to measure the impact of headache on daily life.TheHIT-6 consists of 6 items with 4 response options. A score higher than 50 indicates a greater impact of headache on the daily life of the individual. Its reliability is 0.86.

Procedure:

Institutional ethical committee clearance was taken
Subjects fulfilling the inclusion criteria were included in the study
Written in formed consent was taken after the complete explanation of the procedure and treatment from the subjects
The subjects were informed about the aims and procedure of the study
Preintervention the subjects were assessed using VAS for pain, CVA for forward head posture and HIT-6 for headache
The intervention was carried out for 3 times per week for 4 weeks
Post intervention the subjects were re-assessed using the above-mentioned outcome measures

Intervention: Sub-occipital muscle inhibition

1.The physical therapist positioned himself at the subject's head end while the patient was instructed to lie in a position of supine. [20]

2.Throughout the therapy, the patient was instructed to keep his or her eyes closed. [20]The therapist placed their palms behind the patient's head and their finger pads on the back of the arch of the atlas projection, which is felt between the spinous process of the axis vertebra and the external occipital protuberance. [20]

3.The therapist found the area between the C2 vertebra's spinous process and occipital condyles using the middle and ring fingers of the two hands. [20]

4.Then with the metacarpophalangeal joint in 900flexion, therapist rested the base of the skull on hands. [20]

5.Pressure was exerted upward and towards the therapist.[20]
6.The pressure was maintained for 2 minutes until tissue relaxation was achieved.

Dosage=2 minutes/ 3 times / week for 4 weeks.
Posture correction exercises :- 3 sessions/week for 4 weeks. [22]

EXERCISES	TECHNIQUE	DOSAGE
1.Chin tucks [deep neckflexorexercise]	Sitting- Stood upright and looked straight ahead. Made sure ears were directly over theshoulders.Placedafinger onyourchin.Pushedthechin and head straight back until you felt a good stretch at the base of the head and top of the neck. Standing- Stood against a wallandtouchedthebottom and upper back on to it.Movedtheheadbackward until it touched the wall. Lying- Laid flat on your back, with a small towel roll under the neck. While lying downonthetable,tuckedthe chindownwardandanswered YES.	3setsof 10repititions each. 10secondshold. 5secondsbreakbetween each repetition. 2minutesbreakbetween each set.

2.Foam roller thoracic stretching	To support your head and neck, lay the foam roller horizontally at shoulder blade level, clasp your hands behind your head, and bring your elbows out to the side. Maintain a neutral posture with the neck and head in alignment with your spine, your eyes on the ceiling, and your bottom on the ground. returned to neutral after a brief period of gentle stretching back. performed the stretch five to ten times before rolling down to the second level. Continue until you reach your rib cage's bottom (RATHER THAN THE LOW BACK).	3setsof10repetitions each. 10secondshold. 5secondsbreakbetween each repetition. 2minutesbreakbetween each set.
3.Foundation [founder]	Stood with the legs spread a little more than shoulder width apart. The feet should be parallel to each other without side of the feet straight, it felt like toeing in a bit. Lift the sternum and unlock the knees while pushing hips	3setsof 10repititions each. 10secondshold. 5secondsbreakbetween each repetition. 2minutesbreakbetween each set.

	Back slightly. This is hip hinging. Pressed the body weight back keeping the weight in the heels and gripped the ground with the toes. Once felt the activation of the muscles in low back, brought the arms forward or kept them by your side. Tried to squeeze the outside of your feet and your inner thighs together while maintain the position.	
4.BlackburnY type	Laid on the table, faced down, with arms hanging straight to the floor, and thumbs rotated up (hitch-hiker position). Raised the arms to the side but slightly forward by about 30° compared to horizontal abduction.	3setsof10repetitionseach. 10secondshold. 5secondsbreakbetween each repetition. 2minutesbreakbetween each set.
5.BlackburnT type	Laid on the table, faced down, with arms hanging straight to the floor, and Thumbs rotated up (hitchhiker	3setsof10repetitions each. 10secondshold. 5secondsbreakbetween each repetition.

	position).Raised the arms out to the side with slightly in front of shoulder, parallel to the floor.	2minutesbreakbetween each set.
6.BlackburnW type	Laid on the table, faced down,with the arms abducted Horizontal to side and elbows bent90°pointing down. Rotated arms externally so That forearms came parallel to Ground point forward.	3setsof10repetitions each. 10secondshold. 5secondsbreakbetween Each repetition. 2minutesbreakbetween Each set.

ANALYSIS OF STATISTICAL DATA

The statistical program for the social sciences (SPSS) 20.0 was used to gather and examine the data. A Microsoft Office Excel Sheet (v2019, Microsoft Redmond campus, Redmond, Washington, United States) was used to compile the data.

Descriptive statistics have been shown, such as mean and SD for numerical data and frequencies and percentage for categorical information.

Normalcy of change in VAS, HIT6 and CVA scores from the prior test to post-test differs from the normal distribution. Consequently, the Wilcoxon matched pairs test, a non-parametric test, was used.

With α error set at 5% and β error at 20%, $p<0.05$ was deemed statistically significant for all statistical tests, giving the study an 85% power level.

*= statistically significant difference ($p<0.05$).

RESULT

The study included 90 individuals in all, 47 of whom were men and 53 of whom were women.

Male participants were 22 years old on average, whereas female participants were 23.

The Kolomogrov Smirnov test was used to verify that the distribution was normal. Since the collected information did not have a normal distribution, the VAS, HIT-6, and CVA were subjected to non-parametric testing.

The Wilcoxon test was used to compare the data before and after the intervention, and the findings indicated a significant difference between the VAS, HIT-6, and CVA scores before and after.

Significant difference was observed between pretest and posttest scores of VAS (Z=8.2385,p=0.0001).It means that,significant reduction was seen inVAS scores after intervention.

Significant difference was observed between pretest and posttest scores of CVA (Z=8.1037,p=0.0001).It means that,significant improvement was seen in CVA scores after intervention.

Significant difference was observed between pretest and posttest scores of HIT6 (Z=8.2385,p=0.0001).It means that,significant reduction was seen in HIT6 scores after intervention.

Thus, 4 weeks of intervention was effective in reducing pain, improving the craniovertebral angle and headache in college students with chronic tension type headache.

TABLE1: Distribution of male and females with mean and SD age and duration (months)

Characteristics	MALE	FEMALE	TOTAL
NUMBEROF PARTICIPANTS	37	53	90
AGE (mean±SD)	21.73 ±1.88	22.51±1.37	22.19±1.63

GRAPH1: Distribution of male and females

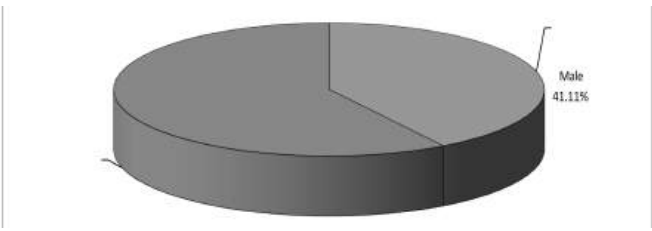


TABLE 2: Normality of change in VAS, HIT6 and CVA scores from pretest to post test by Kolmogorov Smirnov test. The normalcy of change in VAS, HIT6 and CVA scores from pretest to posttest does not follow normal distribution. Therefore, the non-parametric test i.e Wilcoxon matched pairs test was applied.

CHANGEINSCOREFROM	Z-VALUE	P– VALUE
PRETEST TOPOSTTEST INVAS	0.1060	0.0140*
PRETEST TOPOSTTEST INHIT-6	0.1370	0.0001*
PRESTEST TO POSTTEST INCVA	0.3020	0.0001*

*p<0.05indicates skewed distribution

TABLE3: Comparison of pretest and post test scores of VAS,CVA,HIT-6 by Wilcoxon matched pairs test

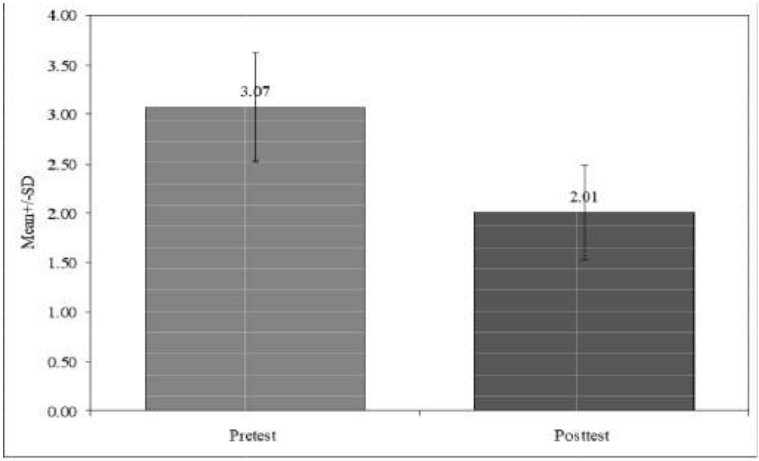
OUTCOME MEASURE	PRE-VALUE (Mean±SD)	POST – VALUE (Mean±SD)	p-VALUE	Meanand SD difference	% OF CHANGE
VAS	3.07±0.55	2.01±0.48	0.0001*	1.06±0.56	34.45
CVA	42.52±5.26	46.31±5.63	0.0001*	-3.79±4.4	-8.90
HIT-6	61.86±3.77	54.13±4.92	0.0001*	7.72±4.08	12.48

Significant difference was observed between pretest and post test scores of VAS (Z=8.2385, p=0.0001).It means that, 34.45% of reduction was seen in VAS scores after posttest.

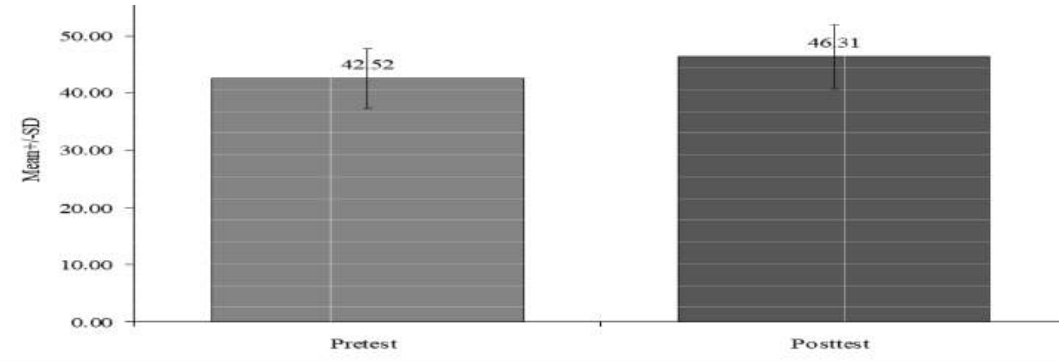
Significant difference was observed between pretest and post test scores of CVA(Z=8.1037, p=0.0001).It means that, 8.90% of improvement was seen in CVA scores after posttest.

Significant difference was observed between pretest and post test scores of HIT6(Z=8.2385, p=0.0001).It means that, 12.48% of reduction was seen in HIT6 scores after posttest.

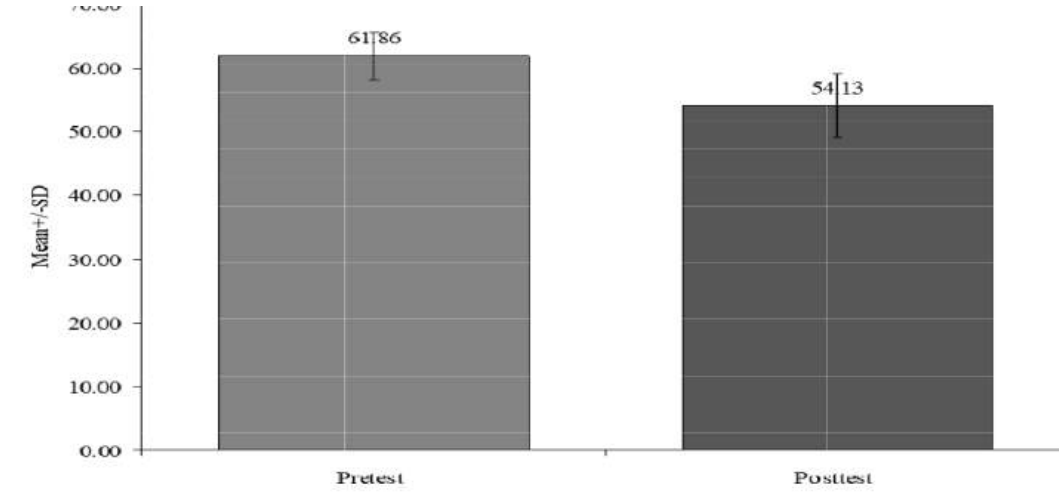
GRAPH 2: comparison of pre and post test scores of VAS



GRAPH 3: Comparison of pretest and post test scores of CVA



GRAPH 4: Comparison of pre test and post test scores of HIT-6



DISCUSSION

The present research was conducted to study the effects of sub occipital muscle inhibition along with posture correction exercises on pain using visual analog scale(VAS), forward head posture (FHP) using cranio- vertebral angle (ON protractor app), and headache using headache impact test(HIT-6) in college students with chronic tension type headache (TTH).The intervention was carried out for four weeks and three sessions per week were administered to participants having forward head posture in college students with chronic tension type headache.

90 individuals i.e., 37 males and 53 females, fulfilling the inclusion criteria were recruited for thisstudy. As seen in table1,mean age of the entire population was 22 years (with the mean age of males being 22 years and females 23years).The data was collected and analyzed using SPPS software.

As seen in table 2, normality of change in VAS, HIT6 and CVA scores from pretest to posttest did not follow normal distribution therefore,non-parametri test i.e.,Wilcoxon signed rank test was used to compare the pretest and posttest scores.

As seen in table 3, the difference in the VAS pre and post intervention showed a significant change($p<0.05$).Thus,postural correction exercises and suboccipital muscle inhibition (SMI) were effective in reducing pain in individuals with tension type headache.

45 people with CTTH were split apart into three distinct categories of fifteen participants each for a study by Sung Hak Cho.The SMIEx (suboccipital muscle inhibition with exercises) group and the SMI group; c) the control group and concluded that 4 weeks of intervention with SMIEx was effective in reducing chronic tension type headache.(22)

The suboccipital muscle inhibition technique is a manual technique that aims to relax the tension in the suboccipital muscles by decreasing the myofascial restriction in the suboccipital region.

Regarding the effects of the suboccipital muscle inhibition technique, Basma H. Hasaneena et.al conducted a study, which found that suboccipital muscle inhibition decreased pain intensity in patients with tension headache through its inhibitory effect that released the suboccipital muscles spasm. (27)

In this study also, we found improvement of pain which can be attributed to many reasons.

First, the inhibitory effect i.e., suboccipital muscle inhibition technique induces muscles relaxation through stimulation of the autonomic nervous system (parasympathetic system) which induces vasodilation and increases the blood flow which in turn washes out the metabolites and pain producing substances thus helping in pain reduction. The second reason is that suboccipital muscle inhibition technique increases the release of β-endorphins from the pituitary gland which decreases the perception of pain. (27)

As our intervention also incorporates exercise protocol, research shows that exercises trigger the release of'feel-good' hormones or endorphins in the brain .Endorphins are peptides produced by the brain that bind to the brains opiate receptors,reducing the perception of pain.Thus,reduction in pain can also be attributed to the various exercises included in this study. (28)

The reduction in pain intensity can also be hypothesized to the change in alignment of the cervical spine achieved using the posture correction exercises,thus decreasing the stresses on the musculature and other soft tissues around the cervical spine.

According to research by Basma H. Hasaneen, suboccipital muscular inhibition reduced the severity of discomfort in patients suffering from tension headaches by releasing suboccipital muscle spasms.

Table 3 shows that college students with persistent tension-type headaches saw a substantial change ($p<0.05$) in their CVA before and after the intervention. Thus, showing that 4 weeks on intervention of SMI with posture correction exercises reduces the CVA and improves the alignment of the cervical spine with respect to the forward head.

In an investigation on the impact of cervical deep muscle flexor exercises on chronic tension-type headaches, Wonho Choi found that these exercises were beneficial in enhancing the craniovertebral angle. As the cervical spine realigned and the discomfort decreased, this study also helped to lessen the tension in the suboccipital muscles. (1)

The improvement in CVA is a direct outcome of the cervical spine's altered position with respect to the COG (center of gravity). The postural cor-

rection exercises might have helped to align the FHP by correcting the hyperextension of upper cervical spine (C1-C3) and flexion of the lower cervical spine (C4-C7). These exercises had an effect on reinforcing the muscles that are weak like deep neck flexors,lower trapezius and stretching the tight muscles pectoralis major, pectoralis minor and sub occipital muscles. (30)

Deep neck flexors- rectus capitus anterior, rectus capitus lateralis, longus capitus and the longus colli muscles play an important role in supporting the cervical vertebrae and there by maintaining the normal alignment. Chin tucks exercise must have helped in recruiting these muscles thus resulting in improvement in alignment of the cranio spinal angle.(29)

The black burns exercises may have contributed in recruiting the scapula retractors which are weakened due to increase in the thoracic kyphosis and rounded shoulders. This posture consumes more muscle energy and makes the scapula move away from the spine causing the weakness of the middle trapezius, rhomboids and latissimus dorsi. Thus, these exercises may have helped in strengthening the muscles and improving the craniovertebral angle.(33)

Prolonged forward head posture leads to shortening of the pectoralis major muscle.Stretching of the pectorals helped in realigning the shoulders, opening up the thorax and thus aligning the cervical spine. (31)
The founder's exercise is known to reinforce the strength of the back muscles, dispersing equal weight through the posterior chain muscles and it also reduces friction on the joints of the spine. Perhaps this workout was beneficial in lengthening of the anterior muscles and strengthening the posterior muscles allowing to maintain at all and erect posture by giving feedback of sustained axial traction.

MCID (minimal clinically important difference) score for CVA is1.40°.In this study the mean difference of CVA is -3.79±4.4, hence the intervention is clinically significant in reducing the forward head posture. (36)

As seen in table 3, the difference between the HIT-6 pre and post interventions how significant change [$p<0.05$].
Research conducted by E. Soderberg, J. Carlssons et.al aimed to study the comparison of 3 non- pharmacological treatments in reduction of chronic tension type headache [CTTH]. This study found that strengthening the muscles in the neck and shoulders can enhance CTTH, which has a good impact on pain intensity, frequency, and standard of living.

Also, there has been research to prove that exercise triggers the release of 'feel-good' hormones or endorphins in the brain. The posture correction exercises must have facilitated the release of endorphins leading to reduction in pain perception, reduced tiredness and improved concentration. This would have directly affected the decline in CTTH and, thus, the HIT-6 score.(28)

In addition, it was observed that patients felt less irritable as exercises facilitated there lease of endorphin leading to reduction in pain hence reducing the score of HIT-6.

Also, research conducted by Cristina Toro-Velasco, Manuel Arroyo-Morales, et.al aimed to investigate the immediate effects of manual therapy in patients with CTTH and concluded that the application of sub occipital muscle inhibition produced an immediate decrease in tension, anger status and perceived pain in them. They postulated that SMI inactivated muscle trigger points which decreased the muscle tension, induced relaxation, decreased emotional tension, reduced pain, improved concentration and thereby aided in performing the activities of daily living efficiently. (32)

MCID score for HIT-6 is 8.In this study the mean difference of HIT-6 is 7.72±4.08, hence the intervention is clinically significant in reducing headache. (35)

Thus,all 3 outcome measuresVAS,CVA and HIT-6 have shown both statistical and clinical significance post sub-occipital muscle inhibition along with posture correction exercises in college students with chronic tension type headache.

Conclusion:

The study comes to the following conclusion:

4 weeks of intervention using sub-occipital muscle inhibition technique along with posture correction exercises is a cost efficient and effective in reducing pain,improving forward head posture and headache in college students with chronic tension type headache and thus can be used in physical therapy practice.

Limitations:

Carry-over effect of the intervention was not measured
Dietary pattern of the students was not taken in to consideration

Future scope:

Long-term effect of SMI and postural correction exercises on quality of life can be studied
Effect of the above interventions on strength of the deep cervical flexors can be assessed.

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Effect of Multitasking on Minimizing Fall Risk in Community Dwelling Older Population- A Scoping Review

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ABSTRACT

Background:

Falls are common within older population. Falls can lead to struggle or difficulty to carry out daily activities for older people. According to the studies underwent in India 22% of the older adults reported hampered daily activities of living which led to functional dependency. There is a need of versatility to walk autonomously involving cognitive and physical tasks. There are evidences of interventions involving multitasking activities to up skill motor as well as cognitive functions among community dwelling older adults so to prevent dependence on daily activities of living by abating the risk of fall. Aim and Objective: To analyze the effect of multitasking on minimizing fall risk in community dwelling older population. Methodology: Various articles from databases like Google Scholar, PubMed, Science Direct, Pro Quest in addition to Web of Science were extracted. Research studies that incorporated multitasking activities as strategies were taken for the review analysis. The analysis was synthesized according to the findings of the research studies included in this analysis. Result and Conclusion: From the analysis it is demonstrated that multitasking is efficient in minimizing risk of fall in community dwelling older adults. Multitasking has favorably improved their functional independency which has helped to upgrade their quality of life. So, it is important to spread awareness about the importance of multitasking as an intervention in community dwelling older population and to incorporate multitasking as an intervention program in geriatric rehabilitation program.

Key Words: multitasking, community dwelling population, fall, activities of daily living

BACKGROUND

With age there is significant rise in chances of fall. Every year, between 25% and 35% of persons over the age of 65 experiences one or more falls with this they suffer terrible repercussions. These falls are leading cause of death in community dwelling older people following terrible injuries1. As age progresses motor, sensory, cognitive, as well as psychosocial skills are all impacted. Among the reasons of improper balance along with gait issues among older persons include poor muscular strength, poor joint awareness, and a few medical disorders. The quality of life can be impacted by poor balance and gait, which could result in functional dependency2. These difficulties also are the important factors for risk of fall among community dwelling older adults which should be taken account of while performing day to day activities.

According to a few studies, 13% of older people (aged 65 to 69) and 46% of people (aged 85 and older) report having balance issues. Along with these percentages, they also demonstrated that 35% of the community dwelling older population says that these individuals have gait difficulties3.

In addition to physical variables, older individuals' gait performance is also influenced by cognition. Degenerative changes in the brain and a number of illnesses cause cognitive skills to decline as people age2. In order to retain functional independence and effective interpersonal interactions in older persons, cognition is crucial. Decision-making, working memory, and processing speed are among the cognitive abilities that are compromised in older people4.

Gait performance and functional independence are both impacted by detriments in any of the functions, such as balance and cognition3. Thus, there is an increased fall risk in older people residing in community since each of the referred elements work concertedly the other, thereby enhancing balance, cognition, and gait performance through strategies is necessary to increase functional independence in this population. To do this, physical as well as cognitive training should be simultaneously included5.

A prior study conducted in India found that 22% of elderly people reported difficulty doing Activities of Daily Living (ADLs), which can result in functional impairment. This can partially overcome its ADL dependency by including physical movements into their daily routines. This can also assist them from becoming dependent to perform ADLs in long term6. Fall preva-

lence in India among geriatric population is 14-53%7.

In India a person with age of 60 years and more are considered in geriatric population. The proportion of the older population has increased, according to the Census of India, from 8.6% to 10.1% between 2011 and 2021, and it is expected to rise even more to 12.1% by 2031. But in India, the proportion of older persons who are dependent has also climbed, from 10.9% to 14.2% 8. To perform all the tasks independently there is prerequisite of multitasking involving cognitive along with motor functions where good balance and postural control is essential9. Regular physical and cognitive exercise employing a dual or multitasking strategy enhances older individuals' independent ambulation in the community, physical health, and social engagement, which lowers their risk of accidents or falls brought on by poor physical condition10.

A systematic review in India identified interventions for fall prevention. They looked at a total of 18 academic articles. According to their research, nutritional interventions, visual and depth perception training, balance and mobility training, ankle exercises, balance tasks in dual task circumstances, yoga, as well as Ayurveda are the most frequently used fall prevention techniques among the geriatric population11.

Many new emerging researches have proved the importance of multitasking training to reduce falling risk in old population to overcome lack of balance, cognition and motor ability to perform daily activities. For instance a study done in 2014 found new interesting way to improve gait performance and reduce fall risk in older adults by using music based multitask training approach which challenges mobility, motor along with cognition abilities. This task engages older people effectively and enhanced their multitask ability12.

Thus, exercises that complement balance, motor and cognition aspects multitask approach are incredibly helpful to improve gait performance and postural control in community dwelling older population thereby minimizing risk of fall13. Specially designed balance and resistance exercise regimens have emerged and improvements are observed in the course of recent years. It has been observed that dual and on the other hand, multitask exercise regimens are very helpful in preventing fall risk than traditionally advised balance alongside with resistance exercises in old people of the community.

AIM AND OBJECTIVE

This study aimed to critically review the recent published researches

that have implemented multitask training in community dwelling older adults.

By analyzing the data to describe and discuss about multitask training which improves balance, stability, cognition as well as functional independency in community dwelling older population.

METHODOLOGY

This study was conducted by collecting the desired data from PubMed, Google Scholar, Research Gate, Science Direct, Pro Quest, Web of Science and Cochrane online. The database search term included key words such as multi-task exercises, community dwelling older adults, multitasking. A variety of combinations of these words were used.

RESULT

This review has included total of 14 Randomized Controlled Trials, 2 Reviews, 1 Pilot, 1 Feasibility, 1 Retrospective and 2 True Experimental studies. Author names, Tittles, Study design, Interventions and conclusions are summarized in the given table. Among them 5 studies are virtual reality based, 2 are music based, 2 are video game based. One study was based on Steplt exercise program, one included interactive stepping exercise (ISE) and other

AUTHOR	TITLE	STUDY DESIGN	INTERVENTION	CONCLUSION
A Trombetti etal. 2011[14]	Effect of Music-Based Multitask Training on Gait, Balance, and Fall Risk in Elderly People	RCT	6 month multitask exercise program to rhythm of piano music	Multitasking exercise program based on music enhanced gait, balance also lowered events and risk of fall.
M Hars etal. 2014[15]	Long-Term Exercise in Older Adults: 4-Year Outcomes of Music Based Multitask Training	RCT	6 month music based multitask exercise program	Findings suggested that 6 month music based exercise regimen prevented age related physical dependency.
N Silva etal. 2021[16]	Effects of a Multicomponent Exercise Program on Groups of Community Dwelling Older Adults with Low Schooling: A Pilot Study	Pilot RCT	Adapted dual task multicomponent exercise	Adapted multicomponent regimen of exercises improved physical well-being of older adults.
Granacher etal. 2011[13]	Comparison of Traditional and Recent Approaches in the Promotion of Balance and Strength in Older Adults	Review		Balance and resistance exercises enhanced functional ability in older adult population. Based on evidences multitask training is effective in improving balance indirectly having higher impact on fall.
A Halvarsso n etal. 2015[17]	Balance training with multi-task exercises improves fall-related self efficacy, gait, balance performance and physical function in older adults with osteoporosis: a randomized controlled trial	RCT	3 month progressive balance training with dual alongside multitasking	This balance exercise regimen, with dual alongside multitasking enhanced fall associated independency, gait, balance, and physical ability in older adult population.
J Chittrakul etal. 2020[18]	Multi-System Physical Exercise Intervention for Fall Prevention and Quality of Life in Pre Frail Older Adults: A Randomized Controlled Trial	RCT	3 month proprioception, strengthening, reaction time, and balance training	Multisystem physical training effectively reduced risk of fall improving proprioception, strengthening, reaction time along with balance training.

A. Halvarsson etal. 2016[19]	Long-term effects of a progressive and specific balance training program with multi-task exercises for older adults with osteoporosis: a randomized controlled study	RCT	Balance-training program including dual- and multitasking with physical activity for 3 months	The study found that multitasking exercises reduces chances of fall and improved gait among older adults with osteoporosis
M Brahms etal. 2021[20]	Cognitive-Postural Multitasking Training in Older Adults – Effects of Input-Output Modality Mappings on Cognitive Performance and Postural Control	Mixed RCT	Multimodal balance regimen cognitive alongside postural triple tasking with compatible and incompatible modality mappings	The findings suggested that there is age related heterogeneity among cognitive with balance after multitasking condition
U Granacher etal. 2010[21]	Balance Training and Multi-Task Performance in Seniors	RCT	6 week balance training including motor and cognitive tasks	The study showed that balance regimen including both motor along with cognitive tasks is an alternative approach to enhance walking
B Wollesen etal. 2021[22]	Multitask training to improve walking performance in older adults with hearing impairment: A feasibility study	Feasibility study	Progressive balance exercises with multitask training mimicking daily activities.	Study concluded that multitask training improved walking performance in older adults with hearing impairments.
T Chien etal. 2022[23]	Effects of multitask training on cognition and motor control in people with schizophrenia spectrum disorders	Experimental	Two stage traditional multitask and video game multitask training each stage for 3 months	They revealed that Traditional multitasking along with video game multitasking improved their cognition, motor control, postural control. Video game multitasking has better improved functional mobility.
H J Lee etal. 2019[24]	The Effect of Multi tasking Exercise Intervention on Cognitive Function in Elderly and Cognitive Impairment Patients: a Pilot Multicenter Study	Pilot study	Multitask exercises including strengthening, balance along with cognition tasks for 8 weeks.	Multitask exercises including exercises along with cognition tasks enhanced motor along with cognition performance among elderly.

E Giannouli etal. 2020[25]	A Novel Square Stepping Exercise Program for Older Adults (StepIt): Rationale and Implications for Falls Prevention	Experimental	Group based stepIt exercise program with progression	The study concluded that this training protocol can be used as a intervention for fall prevention in older adults.
U Grancher etal. 2012[26]	A Qualitative Review of Balance and Strength Performance in Healthy Older Adults: Impact for Testing and Training	Review		Study proves that working on muscles along with multitask balance exercises alongside perturbations can be effective in avoiding falls.
L Sow etal. 2021[27]	Feasibility and effectiveness of interactive stepping exercise on community dwelling older adults: A pilot randomized controlled trial	Pilot RCT	3 month Interactive stepping exercise program (ISE)	Study shows improvement within gait variability among older adults.
B Bier etal. 2014[28]	Identifying training modalities to improve multitasking in older adults	RCT	Visual detection task and alphanumeric equation tasks in three groups- single, fixed and variable training conditions	Fixed and variable conditions showed better results. Affected cognition among older population can be corrected with proper training.
M Mack etal. 2022[29]	Cognitive-Motor Multitasking in Older Adults: A Randomized Controlled Study on the Effects of Individual Differences on Training Success	RCT	12 week motor and simultaneous cognitive motor training (Virtual reality based)	They evaluated: multitask performance is improved after motor and simultaneous cognitive-motor exercises (multitasking) among older adults.
A Mirelman etal. 2013[30]	V-TIME: a treadmill training program augmented by virtual reality to decrease fall risk in older adults: study design of a randomized controlled trial	RCT	Treadmill with VR including motor VS cognitive-motor exercises	Integrating treadmill with VR minimizes chances of falling in old adults.

S R Shema etal. 2014[31]	Clinical Experience Using a 5-Week Treadmill Training Program With Virtual Reality to Enhance Gait in an Ambulatory Physical Therapy Service	Retrospective Study	VR treadmill exercise regimen alongside virtual obstacles progression-cognition challenges	These protocols reviewed enhanced gait performance; mobility as well as postural control also enhanced cognitive along with functional aspects minimizing chances of fall.
A Halvarsson etal. 2014[32]	Taking balance training for older adults one step further: the rationale for and a description of a proven balance training program	RCT	These balance exercise protocols with multitasking approach with 3 levels of difficulties.	This balance exercise program based on multitask approach enhanced independency also minimized risk falling and increased walking speed, also enhanced physical function.
J A Anguera etal. 2013[33]	Video game training enhances cognitive control in older adults	RCT	Newly developed 3D game in multitask mode	They concluded that this newly developed game will help to enhance the cognitive function in older adults.

remaining studies were custom designed multitask approaches.

Table 1- Summary of Author name, Title, Study design, Intervention,

DISCUSSION

The current research is providing summary of the various studies and estimates the effectiveness of multitasking to minimize fall risk in community dwelling older adults. Our study verified and revised the conclusions of previous researches and established that interventions with multitask approach have much promising outcomes in terms of reducing the fall risk in community dwelling older adults. In this review we have encountered various approaches to improve multitasking including virtual reality, video games etc. We suggest that the fall prevention programs in older adults should not only include the traditional balance training program but also multitasking to succeed.

Out of all effects of ageing among this population decrements of cognition as well as motor abilities have huge impact with respect to self dependency in them. Cognition skills like processing speed, attention, visuo-spatial skills, supervisory attention, conceptual reasoning, along with memory, they deteriorate with down the line with ageing normally. Ultimately as the account of this older adults are at high risk of fall in in the community or even at home accompanying impaired dual or multi tasking34.

There are many recent evidences that have worked on multitasking in older adults by implementing interventions with multitasking adapted from daily activities in older adults. A research conducted by B Wollesen etal. 2021,

the study established that progressive balance exercises with multitask training imitating daily activities. The study found that multitasking imitating daily activities improves gait performance in older adults22. Similarly, Alexandra etal. 2016 had also implemented multitask activities with physical activities in their study. Thus, by understanding of this it is cleared that we can implement multitasking imitating activities of daily living to make the tasks interesting in the fall prevention program in community dwelling older adults32.

Studies done by A Mirelman etal. 2013 and M Mack etal. 2022 have used virtual reality based multitasking along with treadmill walking including motor and cognition tasks. Virtual environment challenges, teaches and improve vision, planning, multitask ability. These studies have shown most promising outcomes29,30. Furthermore, the studies have also used a video game setups using cognition and motor stimulations while walking and have proved that it can be used as a multitask training to build interest in older adults to exercise23,33. Many of the studies have also implemented interventions adapted from different exercise programs which have also contributed to reduce fear of fall in older adults25,27.

In daily practice cognition training is rarely integrated by physiotherapist. Thus we support implementing cognition training along with balance and gait function improvement to reduce fall risk in elderly. VR and video games are in trend recently as these focus on cognition also these are very effective to improve memory, planning, decision making, visual stimulation, motor reaction thus focus on multitasking.

Eventually, these interventions will help to reduce life dependency of community dwelling older population.

CONCLUSSION/ RECOMMENDATION

The present review study, by interviewing the literatures concludes that, extent to which the interventions that combines balance, cognition and gait focusing on multitask approach have promising effect to reduce the risk of fall in community dwelling older population.

Along with tradition approaches to reduce fall risk by enhancing balance and gait function in older adults, virtual reality and video game based interventions will have added value to an intervention program addressing motor cognitive association as integration.

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Prevalence Of De-Quervain's Tenosynovitis In Carpenters

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Abstract

Background

The incidence of various musculoskeletal conditions in carpenters, which mostly includes conditions related to wrist and hand due to repetitive movements. De Quervains Tenosynovitis is a condition which occurs due to repetitive ulnar deviation which has significant prevalence in carpenters. De Quervains Tenosynovitis can produce pain that impairs carpenters' ability to perform their craft.

Objective

This study aimed to evaluate the severity of De Quervains Tenosynovitis-related pain using the Numerical Pain Rating Scale (NPRS) and ascertain the prevalence of the condition among carpenters using the Finkelstein test.

Methods

Fifty individuals were chosen based on inclusion and exclusion criteria. Participants were asked to provide written informed consent in the language they could understand. Participants were given the Finkelstein test and the Numerical Pain Rating Scale (NPRS) to gauge their level of pain. After being gathered, the data underwent statistical analysis.

Result

38% of total participants assessed had De Quervains Tenosynovitis. The more is the number of years of experience in carpentry the more is the prevalence of De Quervains Tenosynovitis in carpenters.

Conclusion

According to this study, carpenters have a considerable prevalence of De Quervains Tenosynovitis because of their repeated wrist movements, and it can be decreased with the right ergonomic recommendations.

Key words

De Quervains Tenosynovitis, Carpenters, NPRS, Finkelstein test

INTRODUCTION

De quervain's is the inflammation of the tendon sheath of Abductor Pollicis Longus and Extensor Pollicis Brevis at the point where they cross the styloid process of radius. The tendon sheaths get thickened and sometimes om palpation crepitus can be felt. Movement of the thumb are very painful.1 Physical examination may reveal swelling and tenderness in the region of first dorsal compartment. De Quervain's tenosynovitis affects the both abductor pollicis longus (APL) and the extensor pollicis brevis (EPB) at the point where they pass through a fibro-osseous tunnel (the first dorsal compartment) from the forearm into the hand.The tendon that connects the thumb to the hand is responsible for the movement of thumb abduction. Patients with De Quervain's tenosynovitis have difficulty gripping objects and performing their daily activities.2

Tendons are specialized form of connective tissue unity muscles and bone and as such have functions essential to normal mobility. Extensor Pollicis Brevis originates on posterior surface of the radius below the origin of the abductor pollicis longus; and from the interosseous membrane and inserted on dorsal surface of the base of the proximal phalanx of the first digit. Posterior interosseous nerve (C7, C8) supplies the Extensor Pollicis Brevis muscle. It extends the proximal phalanx and metacarpal of the thumb Abductor Pollicis Longus originates on upper parts of the posterior surfaces of the ulna and the radius, and from the interosseous membrane inserted on the tendon usually splits into two parts: one part is attached to the lateral side of the base of the

first metacarpal, and the other part is attached to the trapezium. Further fasciculi may become continuous with the Opponens Pollicis, or with the abductor pollicis brevis. Posterior interosseous nerve (C7, C8) supplies the Abductor Pollicis Longus muscle. It causes abduction and extension of the thumb at the carpometacarpal joint.3

This disorder is the most common injury involving the wrist and often occurs in individual who regularly use a forceful grasp coupled with ulnar deviation of the wrist. It has been proven by previous studies that carpenters experience various types of work -related Musculoskeletal Disorders, which are group of painful disorders due to repeated basis or overuse. Out of these, 20.1% are known to experience some form of hand and wrist pain.6

The term work related musculoskeletal disorders is used in reference to condition also called cumulative trauma disorder, repetitive strain injury. This condition involving muscles, tendons or nerves are generally manifested by pain, discomfort, tingling in body region. During framing and interior finishing activities, carpenters work with tools often held overhead or below waist level, while sometimes balancing on ladders or the structural frame itself. Fabricating wooden forms for pouring concrete requires forceful use of hand held power tools, grasping heavy wood, manual hammering.6

Diagnosis is usually concluded by a positive Finkelstein's test. To perform the Finkelstein test, the examiner grasps the thumb firmly with one hand, while the other holding the forearm in resting position in neutralpro-supination. A firm traction is than applied on the patient's thumb, pulling it longitudinally and in the direction of slight ulnar deviation to the wrist.4 A negative test indicates patient does not feel any pain radiating up the inside of his/her arm from the thumb. A test said to be positive when positive when pain over the abductor pollicis longus and extensor pollicis brevis tendons at the wrist.5

Numerical Pain Rating scale is he simplest and most commonly used scale, it can be used to assess pain in conditions such as De Quervains Tenosynovitis. The Numerical Pain Rating Scale is most commonly 0 to 10, with 0 being no pain and 10 being the worst pain imaginable. Subject can rate the pain during activity and also during the rest. Advantages of Numerical Pain Rating Scale include simplicity, reproducibility, easy comprehensibility, and sensitivity to small changes in pain.

NEED FOR STUDY

Carpentry involves monotonous and repetitive tasks such as cutting, assembling, pressing, and finishing, as well as a variety of activities that require prolonged work with a variety of abnormal postures and movements. Work-related factors include heavy hand movements and unnatural repetitive wrist movements.These movements predispose to De Quervain's tenosynovitis. Therefore, there is a need to determine the prevalence of De Quervain's stenosynovitis in carpenters.

AIM AND OBJECTIVES

AIM :

To find out prevalence of De Quervain's Tenosynovitis in Carpenters

OBJECTIVES :

1. To assess pain due to De Quervains Tenosynovitis by using Numerical Pain Rating Scale (NPRS)

2. To determine prevalence of De Quervain's Tenosynovitis by the Finkelstein test in carpenter

MATERIAL AND METHODOLOGY

METHODOLOGY:

Study design : Observational study
Sampling method : Convenient sampling
Sample size : 50
Study population : Carpenters
Study Setup : In and around Pune

MATERIAL :

1. Consent Form
2. Data collection sheet
3. Notepad and Pen

INCLUSION CRITERIA:

1. Wrist pain while working
2. Carpenters with at least 5 years of experience
3. Willing participants

EXCLUSION CRITERIA :

1. Wrist Fracture , Scaphoid fracture
2. Rheumatoid Arthritis

OUTCOME MEASURES :

1. Numerical Pain Rating Scale (NPRS)
2. Finkelstein Test

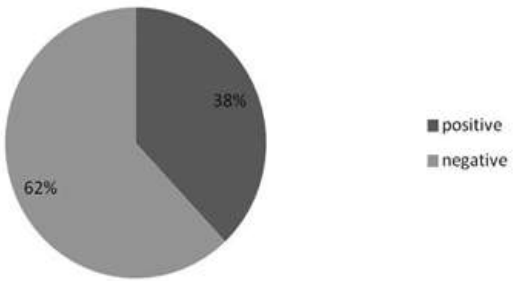
RESULT AND DATA ANALYSIS

Table 1 : Percentage of Finkelstein Test of all participants

Positive	**19**	**38%**
Negative	**31**	**62%**

Graph 1 :Percentage of Finkelstein Test of all participants

Interpretation : Percentage of Finkelstein test shows 38% population positive



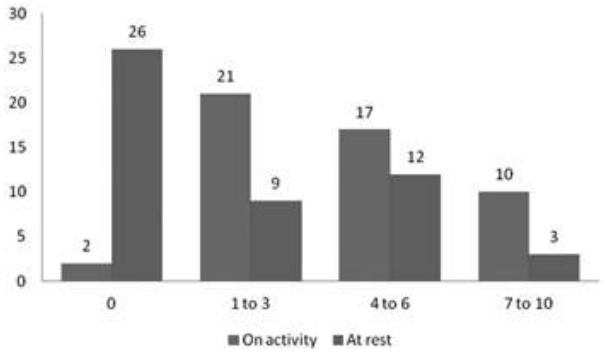
for test 62% negative

Table 2: Numerical Pain Rating Scale (NPRS) (On activity and At rest) of all participants

NPRS	On activity	At rest
0	2	26
1-3	21	9
4-6	17	12
7-10	10	3

Graph 2 : Numerical Pain Rating Scale of all participants

Interpretation: In this graph of NPRS 10 participants experiences severe pain



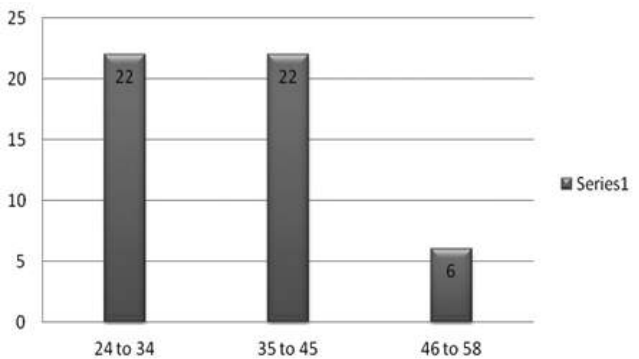
on activity while 3 participants experiences severe pain at rest

Table 3: Age wise distribution of all participants

Age	Total participants	Percentage
24-34	22	44%
35-45	22	44%
46-58	6	12%

Graph 3 : Age wise distribution of all participants

Interpretation : Age wise distribution among total population including 22 participants from age group 24 to 34 and 35 to 45 . 6 participants from age



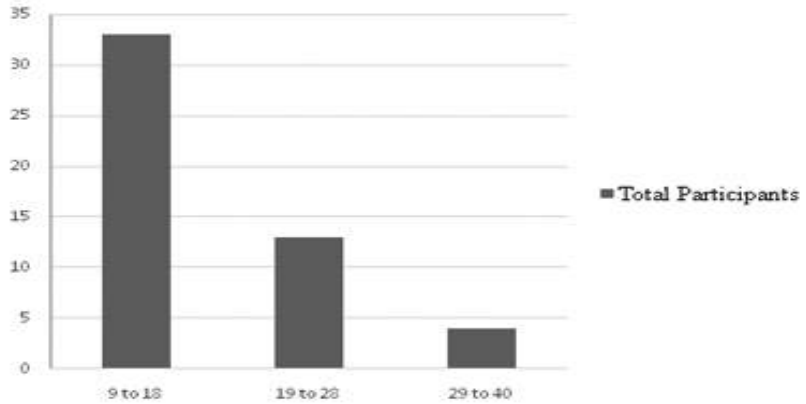
group 46 to 58

Table 4 : Carpenters Experience

Experience	Total participants	Percentage
9-18	33	66%
19-28	13	26%
29-40	4	8%

Graph 4 : Carpenters Experience

Interpretation : Experience in years in carpenters including 33 participants from experience 9 to 18 ,13 participants from 19 to 28 and 4 participants from



29 to 40.

DISCUSSION

The current study was conducted to determine the prevalence of De Quervains Tenosynovitis in 50 carpenters with inclusion criteria of minimum 5 years of experience of carpenters in carpentry. Number of working hours per day is also considered while selecting population for current study. Numerical Pain Rating Scale (NPRS) has been used to assess the pain of carpenters at wrist joint including both on activity and at rest. The prevalence was studied using the Finkelstein test, which is a commonly used active test to detect the presence of De Quervain's tenosynovitis, in which the subject clenches the fist, places the thumb inside, and then deviates the wrist to the ulnar side 4. aggravates damage to the tendons of the abductor pollicis longus and extensor pollicis brevis.The study found that when the tests were administered, 38% of the population tested positive overall, meaning that on either side, 38% of the gen-

eral population tested positive.It was therefore concluded that the prevalence of De Quervain's tenosynovitis among carpenters is moderate.

According to number of years of experience in carpentry, it showed that the more numbers of years of experience the more positive result for Finkelstein test. Participants with experience between 9 and 18 (n=33), 3 participants tested positive accounting for 9.09%. Similarly for number of years of experience between 19 and 28, total participants were 13, accounts for 84.61% for positive 12 participants.Range of experience from 29 to 40 tested positive for all the participants i.e. n=4, showed 100% result.On consideration of age group of carpenters as the age increases population tested showed positive results for Finkelstein test as their experience in carpentry also exceeded. Age group of 46 to 58 years of carpenters has 100% result and diagnosed with De Quervains Tenosynovitis. Also age group from 35 to 45 showed 50% positivity for test performed among 22 participants. The study done by Grace Lemasters titled as Prevalence of work related musculoskeletal disorders in active union carpenters suggests that work related musculoskeletal disorders of the upper extremities in particular shoulder and hands or wrists, were most prevalent among all carpenters particularly drywall or ceiling and formwork subspecialties.Drywall and ceiling installation involves the use of screw guns, which are often held in awkward positions. This requires workers to reach overhead for long periods of time, putting them at risk for injury.Hence there is chances of prevalence of upper extremity work related musculoskeletal disorders6 .De Quervains Tenosynovitis is disease known to be caused due to high repetitive task involving repeated wrist movements for a prolonged period of time. Carpenter's work is a profession with monotonous and very repetitive tasks, such as logging, assembly, pressure, and finishing, and is a variety of other activities, including long -term work in various postures and unusual movements.Factors related to the reported work include a strong manual effort and a repetitive clumsy wrist movement. Pratibha Maurya, Gokhale Priyanka, and Anagha Palkar have undergone research on the tailor's De Quervains .

Authors used Finkelstein test to determine De-Quervain’s Tenosynovitis. A study was conducted with 100 subjects, who were selected according to the inclusion and exclusion criteria. Out of those participants, 75% had DeQuervain’s Tenosynovitis. The study concluded that the prevalence of DeQuervain’s Tenosynovitis is more in tailors because of their working pattern.7When more experienced carpenters were tested for Finkelstein test they showed positive results, while less experienced carpenters were tested negative for Finkelstein test. Although Finkelstein test is negative in less experienced

carpenters they have pain in wrist because of prolonged hours of working. Now a days repetitive movements of wrist joint has been reduced due to arrival of more advanced technologies in carpentry. Advanced technologies such as table saw, jig saw, handheld sanders, nail gun, wood router, grinding machine, etc has replaced the old fashioned tools such as coping saw, pannel saw, hammer, hand drill, crosscut saw, etc in more or less amount, which lessened the work of wrist joint musculature. This advanced technologies has reduced labour of carpenters who were prone De Quervains Tenosynovitis. This explains the reason behind the negative results of Finkelstein test in less experienced carpenters. Occurrence of pain in less experienced carpenters might be due to other reasons, mostly being lifting heavy objects, and pulling or pushing of heavy objects. Taking time to exercise, proper positioning of hand and wrist while performing work, avoiding extreme ulnar and radial deviation, and during wrist movements keeping forces low these all ergonomic changes will be heplful in preventing De Quervain's Tenosynovitis and hence improving their performance. It has been observed that the intensity of pain varies according to experience of carpenters in carpentry.

CONCLUSION

This study concluded that prevalence of De Quervains Tenosynovitis is significant in carpenters due to their repetitive wrist movements and it can be reduced by proper ergonomic advice

LIMITATIONS

1. Sample size was less
2. Advanced technology in carpentry showed low prevalence of De Quervains Tenosynovitis

FUTURE SCOPE

1. Similar study can be done in different professions
2. Musculoskeletal conditions can be assessed in same population depending on nature of work
3. Different age group can be considered

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Prevalence of Musculoskeletal Injuries in Rope Mallakhamb Players

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Abstract

Background: Mallakhamb is the name given to a little-known style of physical culture practiced in India, originally from Maharashtra. It is mixture of strength training, wrestling and yoga postures practiced in pole and rope forms. It is practiced developing strength, agility and flexibility. It has now developed into a sport with championships held annually at district state and national levels. The rope mallakhamb is one of the types of mallakhamb and also an aerial form of sports. It answers to the modern-day problems like space, transportation and is also prone for twisting and bending injuries. The purpose of the study was to know the commonest injuries in rope mallakhamb players.

Method:

A self-administered close-ended validated questionnaire was prepared by the researcher incorporated with Nordic musculoskeletal questionnaire and questions were asked to the players and recorded by the researcher.

Results:

There was a prevalence of injuries (49.43%) in these young players commonly affected joint was ankle followed by knee, wrist and shoulder. One of the reasons causing injuries could be due to inadequate grip (74.72%).

Conclusion:

In the current study, a moderate prevalence (49.43%) of injuries was noted in young rope mallakhamb players. Lower extremities injuries were more common than Upper extremities. It has been observed that, the Soft tissue injuries (muscles and ligaments) of the lower extremities have commonly occurred.

Keywords:

Rope mallakhamb players, Musculoskeletal injuries, Prevalence, Muscle Sprain, Muscle Strain.

Background:

Mallakhamb is the name given to a little-known style of physical culture practiced in India, originally from Maharashtra. It is mixture of wrestling, strength training and yoga postures practiced in pole and rope forms. Mallakhamb originally developed in the state of Maharashtra in India and was practiced developing strength, agility and flexibility. [1] Mallakhamb has now developed into a sport with championships held annually at district state and national levels.[1] In 2010 study stated that Mallakhamb has emerged as a hybrid physical practice - an embodiment of ancient Indian wrestling forms, which have merged with yoga and then been heavily influenced by British colonial competitive sports.[1]

It is believed to have beneficial effects on physical and emotional health. The empirical evidence accumulated over the several decades supports the yoga-related benefits for physical health.[2] The manner in which the body is turned, twisted and balanced in the Mallakhamb keeps the spectators spellbound. The sport Mallakhamb helps to develop one's reflexes, coordination, speed and concentration, Training of Mallakhamb also helps in practicing many other sports which include athletics, wrestling, horse-riding, gymnastics, judo, tennis etc.[3] Glenohumeral vault' on the Mallakhamb will improve the wrestlers throw. Most of the wrestler's use the mallakhamb for shadow practicing most of the exercises in mallakhamb are fabricated keeping wrestling in view.[3]

In Gymnastic, Mallakhamb expands the endurance, strength and power of the gymnast needed for sport events. Badminton and Tennis, A ladder on the mallakhamb will build up the muscle of the shoulder girdle and forearm. It also increases the flexibility of the wrist joint.[3] The rope mallakhamb is one of the types of mallakhamb which answers to the modern-day problems like space and transportation. Various yogic and Gymnastic positions are performed gracefully on the rope mallakhamb and that to without tying literal knots to the scope.[3]

Although, Mallakhamb started as a complementary exercise for wrestling, it soon proved to be complementary exercise for all other sports disciplines, as it improves neuro – muscular coordination, balance, courage, confidence, physical parameter and many more abilities. It is aikido, competitive sport, performing art, spirited yoga as well as a circus apparatus too.[4]

Now consistent coaching of Mallakhamb has been started in numerous countries abroad.[4] The 'Germany Mallakhamb Federation' 'Mallakhamb Federation of the USA' has already been formally formed Mallakhamb, for the first time at the International Level.[4]

Material and Methodology:

The study was ethically approved by ethical committee. The STROBE guidelines were followed for this descriptive cross-sectional study. The subjects actively participated in the study and responded to close ended questionnaire. The data was collected from various academies of mallakhamb in Pune. The self-administered questionnaire included the questions pertaining to Personal and Duration of practice, Warm-up and Cool down duration, Types of asana's performed, Commonest injuries and site and the occurrence of pain, diurnal variation, site and intensity of pain (Nordic Musculoskeletal Questionnaire). Self-administered questionnaire was validated from the experts of Musculoskeletal Physiotherapy. Sampling method was convenient sampling. 91 subjects were recruited for this cross-sectional study. Consent was taken from the coaches of the academies before conducting the research. Inclusion criteria was age group of 6 to 18 years (average age 12), players were of minimum 3 months practiced and both the genders were included (Females-83 and Males-8). Exclusion criteria were recent fracture, traumatic injuries, recent surgeries, any congenital deformities or disorders. The data collected had an average of players that attended 22.75 sessions per month consisting of an average session for 30.33 minutes.

Results:

Table no.1 Types of asanas performed

Twisting	10.98%
Bending	16.48%
Balancing	19.78%
Twisting and bending	19.78%
Twisting and balancing	3.29%
Bending and balancing	2.19%
All of those	27.47%

Table no.2 Muscle injuries suffered while performing mallakhamb in daily practice

Hamstring pull	29.67%
Stomach cramp	8.79%
Back sore	13.18%
Bicep pull	7.69%
None	50.54%
Total muscle strain	59.33%

Table no.3 Specific joint sprain

Ankle	26.37%
Knee	6.59%
Wrist	4.39%
Shoulder	2.19%
None	64.83%
Muscle sprain	39.54%

Table no.4 First line of treatment

Home remedies	16.48%
Icing	10.98%
Bandage	10.98%
Spray	19.78%
Rest	9.80%

Table no.5 Nordic Musculoskeletal Questionnaire

Neck	3.29%
Shoulder	5.49%
Upper back	4.39%
Elbow	2.19%

Wrist/hand	**13.18%**
Lower back	**7.69%**
Hip/thigh	**21.97%**
Knee	**10.98%**
Ankle/feet	**19.78%**

Discussion:

The goal of the present study was to identify the prevalence of musculoskeletal injuries, as well as common site of injury in rope mallakhamb players. The participants of the present studies were 91 rope mallakhamb players, including both genders, from sports academy in Pune region. Participation rate was higher in females than males. There was a prevalence of injuries (49.43%) in these young athletes. Rope mallakhamb is a sport of strength, speed, agility, flexibility, stamina and endurance.

Controlled movements of various asanas such as twisting, bending, balancing, and turning are some skills exhibited on rope during the performance. It is generally seen that due to time limit of about 90 seconds and elation of the sport the player makes the movement instantaneously and meticulously which may lead them towards the injury. Injuries occurs more commonly due to inadequate grip or while changing from one asana type to another one. The most common cause of injury noted in the present study was due to inadequate grip either of hand or toes (74.72%).

Climbing, rapid movements, instant release, stretching and flexing styles while performing rope mallakhamb can result in ankle injury, knee injury, wrist injury, shoulder injury, etc. In this study it was noted that injuries on the dominant side were more common. The ankle was most commonly injured site followed by knee and wrist. In this game the toes (ankle) and hand (wrist) always come in direct contact with the object (rope). The maximum used body part in this sport is lower extremity and hence it is frequently injured. It was observed in the current study that upper extremity injuries mainly occurred in hand, wrist and shoulder. The palm often comes in contact with the rope which sometimes causes friction burns, skin abrasions to the hand and fingers.

The most common injuries observed in the players were joint sprain (39.54%). Ankle and knee joints were more common. Muscles strain was noted in 59.33% - commonly in thigh muscles (hamstring). This confirmed that lower

extremity injuries are more common while performing this sport. Majority of sports injuries on this study were relatively mild and required simple form of treatment. The first aid offered for most injuries was spray, bandage, ice and rest respectively. Although a considerable number of players suffered from ankle and knee sprain as well as muscle strain, very few were taken for physiotherapy treatment.

A combination of loose grip and sudden turns creates a situation of possible injury. During a fall the palm and hand were often injured due to friction caused in between rope and palm it also causes friction burn on thighs due to winding of rope around thigh.

Handful of the participants used protective device while playing. The players mainly use the knee and ankle supports. Since ankle, knee and wrist are more commonly injured sites, good use of protective equipment is essential. All participants who used protective device were benefit from the use, as they aid performance and reduce the risk of injury. Suitably fitted protective gears will help to prevent injury and re- injury. [5]

It has been noted that most of these injuries results from intrinsic risk factors; others are due to poor training practices, lack of conditioning, or insufficient warm up and stretching. In any sport, an appropriate warm up and cool down period is necessary. Almost all the players in the current studies followed a warmup period of 10 -15 minutes and did cool down exercises after every session of practice still, injures took place. It was because of improper warm up and cool down has shown to increase the risk of injury. [5]

Prevention and intervention have become nucleus points for researchers and clinician. In order to decrease the recovery time and promote healing, swelling and tissue congestion in the injured area must be controlled and reduced.[5] Continuation of training and/or performing following an injury significantly increases the severity of most injury. Hence, the injured players must take rest till the injury is healed completely. [5]

The result of the studies indicates that the injury rate in young rope mallakhamb players is notable. This research provides a platform for further research on various injuries occurring in rope mallakhamb players, especially regarding the severity of injuries and methods to prevent and reduce such injuries. A detailed study of the potential provided to these players will help to reduce their prevalence and further improve performance.

Conclusion:

In the present study, a moderate prevalence (49.43%) of injuries was noted in young rope mallakhamb players. Lower extremities injuries were more common than Upper extremities. It has been observed that, the Soft tissue injuries (muscles and ligaments) of the lower extremities have commonly occurred.

Author's contributions:

Dr. Snehal Solanki- Concept, Design, Defination and Interlectual Content, Literature search, Clinical studies, data acquisition, data analysis, statistical analysis, manuscript preparation, manuscript editing, manuscript review.

Dr. Sakshi Pandit- Concept, Design, Defination and Interlectual Content, Literature search, Clinical studies, Data acquisition, Data analysis, Statistical analysis, Manuscript preparation, Manuscript editing.

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Dr. Sonam Jain- Concept, Design, Defination and Interlectual Content, Literature search, Clinical studies, data acquisition, data analysis.

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Prevalence of Cervicogenic Headache

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Abstract

Aim:

Our study was aimed to know the prevalence of cervicogenic headache (CGH) among IT professionals, we were interested to find the causative factors for cervicogenic headache (CGH), which work related tasks such as prolong working hours, night shifts, improper furniture at home and work place which leads to imbalanced posture and strained the musculoskeletal system.

Objectives: The primary objective was to evaluate the prevalence of cervicogenic headache (CGH) among IT professionals and investigate the influence of work hours, workplace functional factors , and lifestyle habits on its occurrence.

Methodology: The study design was a cross-sectional study was conducted across the in an IT company of Pune, involving 200 employees. Data were gathered through a structured questionnaire and the cervical flexion-rotation test. Participants reported information about their working hours, neck pain symptoms, and lifestyle-related factors. The sample consisted of 130 males and 57 females, predominantly aged 25 to 35 years. The cervical flexion-rotation test was utilized as a diagnostic tool to assess the prevalence of CGH.

Keywords: Cervicogenic headache (CGH), occupational health, cervical spine dysfunction, ergonomic risk factors, sedentary behaviour, cervical flexion rotation test.

Introduction

Cervicogenic headache (CGH) is a secondary headache disorder originating from dysfunction or injury in the cervical spine, particularly the neck region. Unlike primary headaches, such as migraines or tension headaches driven by neurological factors, CGH arises as a symptom of underlying cervical issues. It typically manifests as a one-sided headache that intensifies with neck movement or prolonged awkward postures. The pain often begins in the neck and radiates to the back of the head, extending to the forehead, temples, and sometimes the eye region [1].

CGH Pathophysiology Cervicogenic headache (CGH) originates from structures in the neck, including the cervical vertebrae, muscles, and nerves. While the cervical spine comprises seven vertebrae, CGH is primarily linked to the upper three (C1, C2, and C3) due to their close anatomical and functional connection with the trigeminal nerve, which plays a key role in facial and head sensation [2].

Atlanto-Occipital Joint: Positioned between the base of the skull and the first cervical vertebra (C1), this joint often contributes to CGH. Dysfunction or inflammation here can lead to pain radiating from the neck to the back of the head and forehead. Since this joint facilitates the nodding motion of the head, restrictions in its movement can cause muscle imbalances and referred pain [3].Atlanto-Axial Joint: The second cervical vertebra (C2) articulates with C1 at the atlanto-axial joint, allowing for nodding of the head. When this joint is dysfunctional, either due to trauma, degenerative changes, or muscle dysfunction, it can also cause headaches. Pain from the atlanto-axial joint often presents in the temples, around the eyes, or the back of the head [3].Atlanto-Axial Joint:The second cervical vertebra (C2) connects with the first cervical vertebra (C1) at the atlanto-axial joint, enabling head rotation. Dysfunction of this joint, due to trauma, arthritis, or muscle tension, can lead to headaches. Pain from the atlanto-axial joint is typically felt in the temples, around the eyes, or at the back of the head.

Musculature:Key neck muscles, including the upper trapezius, sternocleidomastoid, and deep neck flexors, contribute to cervicogenic headaches (CGH). Poor posture or overuse can cause these muscles to become tense or strained, irritating the cervical nerves. Tightness, particularly in the upper trapezius, can result in referred pain that radiates to the head, a common characteristic of CGH. Understanding these anatomical factors is crucial for effec-

tive diagnosis and treatment, which often includes manual therapy, nerve blocks, or joint injections to address the underlying cervical dysfunction.(3)

The Impact of Modern Work Habits:

In recent years, CGH has been increasingly recognized in people working in technology or other jobs that require long hours of sitting and repetitive neck movements. With the rise of sedentary work, especially in IT professions, individuals are spending extensive hours at computers, often in poor ergonomic conditions. This leads to chronic neck strain, postural problems, and a higher risk of CGH.(4)

Factors Contributing to CGH in IT Workers:

Postural Strain: Disparity in the height of table and chair made the computer operator to to lean in front for screenthis will lead change the curvature of cervical spine and reduction of the normal cervical lodosis. Obliteration of normal cervical lodosis leads to musculoskeletal imbalance, it puts excessive stress on C1 to C3 nerve roots. Irritation of this neve roots leads to CGH. (4)

Prolonged Sitting: Usually IT workers have shifts of 8 hrs, but due to demanding nature of job, projects near submission, disparity of timings between India and foreign based clients the working hours exceeds more than 10 to 12 hours. Prolong sitting in improper posture without breaks more than 8 hours will leads to postural strain. It was found that more than 4 hours of sitting which will significantly contributing to CGH.

Screen Time: Excessive screen time, coupled with poor posture and infrequent breaks, worsens neck strain. Improper ergonomic setups, such as poorly positioned monitors and chairs, further increase the likelihood of CGH.(5)

When eyes are forced to focus on too high and too low bright or deem computer scree for a long period of time it would strain the eyes and neck by misaligned or wrong cervical spine angulation. It was noted that those who are complaining of eye issues with regards to the scree time with all above mentioned factors will definitely complained of neck pain and also cardiovascular issues.(6)

A major factor contributing to these issues is poor ergonomic setup. Many IT professionals work in environments where their workstations don't

meet ergonomic standards. Monitors may be placed too high or low, forcing awkward neck postures, while chairs may.In offices generally revolving chairs are used, chairs heights usually not fixed also the chair have lack of back support and there is lot of distance between the back rest and lumber spine. Normal lumber spine curvature is lordotic which is not maintained and the person will have to bend forward so there would be more upper cervical spine will flexion, which subjects upper cervical spine i.e C1 &C2 stress, muscle imbalance and strain. In 2018. Chen et al.ITconcluded that companies not providing ergonomic furniture because of that computer engineers have 30% more risk of development of cervicogenic headache than the other population. (7)Another study done by Smith et al. In 2009, even though IT industries are blooming carriers but they are not provided with proper work conditions, prolong working hours, improper breaks, deadlines for submissions and targets, not having proper physiotherapy and ergonomic advices are more prone for cervicogenic headache.(8)

The use of laptops and mobile devices adds further strain. Compared to desktop setups, laptops often prompt users to adopt a hunched posture, placing added stress on the cervical spine. Their compact screens and immovable keyboards can lead to prolonged non-ergonomic positions, increasing the likelihood of neck pain and headaches. According to Kumari and Pandey (2010), individuals who frequently used laptops, particularly in non-ergonomic settings like on sofas or in bed, experienced a notably higher occurrence of neck-related headaches than those who used desktops with ergonomic adjustments (9).

A sedentary work routine further worsens symptoms, especially for IT professionals who often remain seated for extended periods without regular movement. This prolonged inactivity can decrease blood circulation and cause muscle stiffness, particularly in the neck and shoulder areas. Such immobility may lead to joint dysfunction and elevate the risk of cervicogenic headaches. Research by Johnson et al. (2015) revealed that individuals who incorporated regular movement and stretching breaks experienced a 32% reduction in symptoms associated with cervicogenic headaches, emphasizing the role of physical activity in prevention and management. (10)

Methodology and Materials Methodology: -

1. Study Setup- IT industry
2. Sampling Technique- Simple randomized sampling
3. Sample Size- 200
4. Study Design - Survey Study setting

Materials required: -

1. Consent Form
2. Data Sheet & Pen
3 Goniometer

Inclusion criteria: -

1. Male & Female: - Both male and female are selected who are working in softwear companies and using computers for at least 3-5 years.

2. Age: 25-35 3. Male and Female working for less than and more than 8 hours.

Exclusion criteria:

1). Subjects who are diagnosed with specific cervical conditions like Cervical spondylosis, Cervical herniated disc, Degenerative disc disease.

3) Congenital and acquired spinal deformities
Procedure: - Cervical Flexion Test –

RESULTS

Table no. 1: Distribution of subjects according to gender. Gender No. of Participants MALE 130, FEMALE 57 Graph 1: Distribution of subjects according to gender.

Table no. 2: Distribution of subjects according to their presence and absence

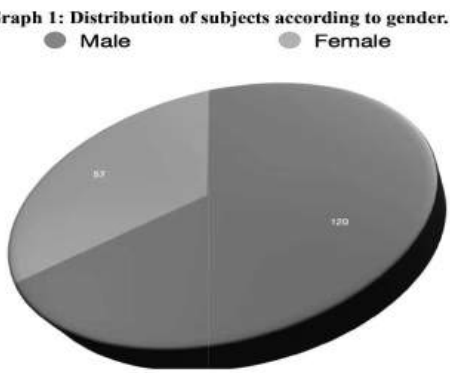


Table no. 2: Distribution of subjects according to their presence and absence.

Availability	No.of participants
Presence	187
Absence	13

Table no. 3: Source of distribution of subjects for prevalence of cervicogenic headache according to gender.

	Presence of Cervicogenic Headache	Absence of Cervicogenic Headache
MALE	77	53
FEMALE	45	12
TOTAL	122	65

Graph 3: Source of distribution of subjects for prevalence of cervicogenic headache according to gender.

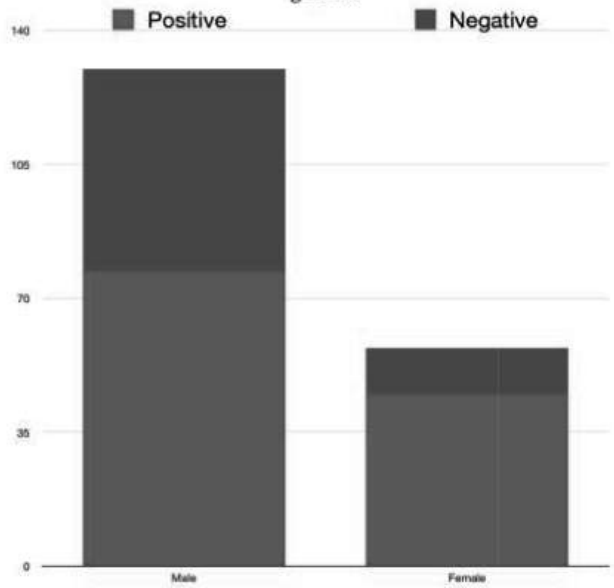


Table no.4: Source of distribution of subjects for prevalence of Cervicogenic Headache according to Age.

Age Group	Absence	Presence	Total
25-27	17	36	53
28-30	17	27	44
31-32	15	26	41
33-35	16	33	49

Graph 4: Source of distribution of subjects for prevalence of Cervicogenic Headache according to Age

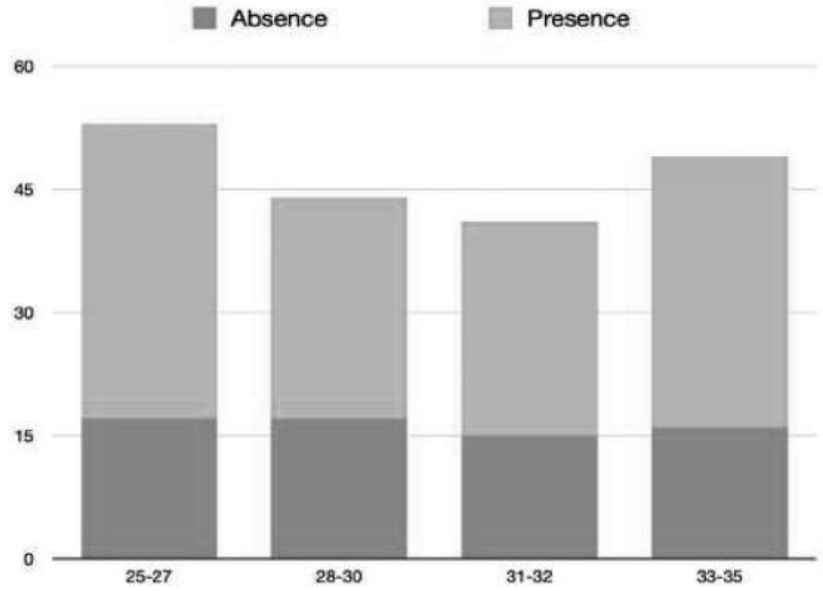
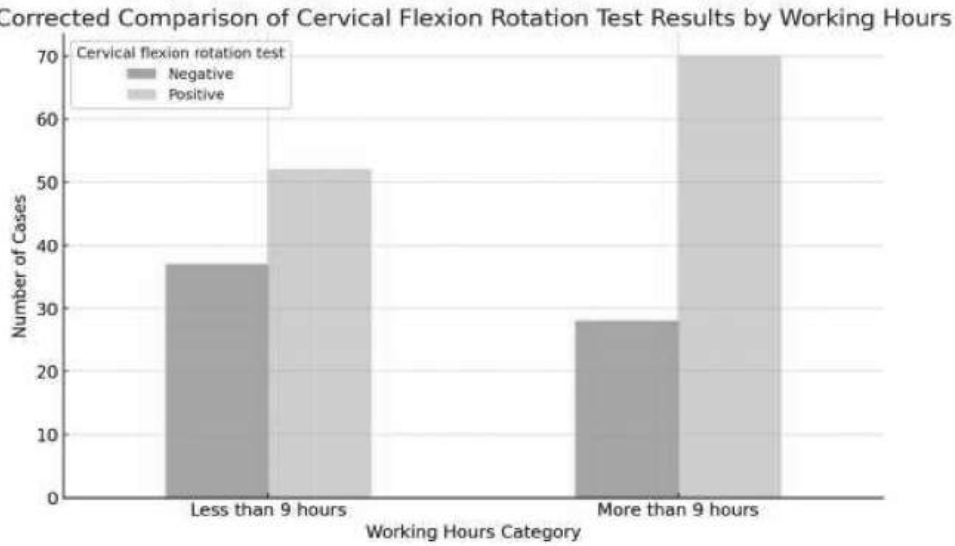


Table no. 5: Distribution of subjects according to their Working Hours.

Working hours	Negative	Positive	Total
Less than 9 hours	34	55	89
More than 9 hours	31	67	98

Graph 5: Distribution of subjects according to their Working Hours.



Discussion

This study aimed to evaluate the prevalence of cervicogenic headache (CGH) among IT professionals working in a corporate setting, with a focus on how factors such as prolonged sitting, improper posture, and extended work hours contribute to neck discomfort. Data were gathered on participants' work habits, neck pain levels, and outcomes from the cervical flexion rotation test, a widely used diagnostic method for CGH.

The cross-sectional research involved 187 IT professionals, comprising 130 males and 57 females, indicating a male-dominated workforce. Participants provided information about their working hours, neck pain, and other symptoms related to CGH, while the cervical flexion rotation test was utilized to determine the prevalence of CGH.

Research consistently shows that individuals in sedentary jobs, such as IT professionals, are more prone to developing musculoskeletal disorders, including neck pain and CGH. For instance, Kumari and Pandey (2010) reported that over 80% of computer users experienced neck and back pain, with poor posture being the primary contributing factor.

Our study supports these findings, showing that most IT professionals working over 9 hours a day exhibited signs of CGH, particularly those in the 25-27 age group.

While the study included more male participants, a higher proportion of positive CGH cases was observed among females. Out of the 130 male participants, 77 tested positive for CGH, compared to 45 out of 57 females. Although the larger number of male participants may influence overall results, the percentage of females with CGH was significantly higher, considering their smaller representation in the sample.

Notably, 98 participants reported working over 9 hours daily, which was strongly linked to positive outcomes on the cervical flexion rotation test. The age group most affected was 25-27 years, with half of the individuals in this range testing positive for CGH. These findings align with research by Vincent and Luna (2020), which highlighted that younger individuals in sedentary roles are particularly prone to neck-related problems. (9)

More than 45% of the female participants who worked extended hours

reported experiencing neck discomfort, reinforcing the notion that prolonged static postures contribute to a higher prevalence of CGH among women in the workforce. These findings align with those of Smith et al. (2009), who observed that women in sedentary occupations are more prone to musculoskeletal issues, potentially due to differences in anatomy and hormonal influences. (8)

Gaurai Gharote et al. highlighted several primary factors contributing to CGH, such as improper sitting posture, prolonged sitting durations, maintaining static positions, and inadequately designed workspaces. They also noted that fatigue, especially when it reaches extreme levels, significantly contributes to the development of these headaches. (11)

Although CGH is a chronic condition, it was surprising to find that only 2% of participants had sought advice from a neurologist, and just 10% had visited a pain clinic. This low rate of medical consultations might be attributed to the moderate severity of the pain, prompting many individuals to manage it independently without seeking professional help. However, this lack of medical guidance could potentially lead to the overuse of medication. (12)

Recommendations:

1.Ergonomic Improvements: Provide IT professionals with properly designed ergonomic workstations to reduce neck strain and encourage healthy posture.

2.Scheduled Breaks: Promote regular breaks during extended work periods. Short breaks every 30-40 minutes can help ease neck tension and lower the risk of CGH.

3.Increased Physical Activity: Encourage incorporating stretching routines and neck mobility exercises into daily habits to mitigate CGH risks.

4.Education and Medical Consultation: Raise awareness among workers about the importance of seeking medical advice for persistent neck pain. Early diagnosis and intervention for CGH can prevent long-term complications.

Conclusion:

The study determined that cervicogenic headaches are highly prevalent among IT professionals, with a notably higher occurrence observed among female workers.

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Effectiveness Of Aerobic Dancing On Pain And Anxiety In Primary Dysmenorrhea Among Adolscent Females

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Abstract
Introduction:

PrimaryDysmenorrhea is a mainstream gynecologic issue in young females. Aerobic dancing surges blood flow and metabolism of uterus, which means increasing metabolism is a key for reducing pain and anxiety, despite this, evidence based studies are limited.Methods and Materials: After getting ethical clearance, convenient sampling was done and an experimental type of study was conducted on 100 adolescent females aged 18-25 years which were selected on the basis of inclusion criteria for a period of 8 weeks for about 25-30 min for 3 days/week. The samples were selected and assessed for pain and anxiety using VAS [ICC= 0.99, 95%CI 0.989 to 0.992] and State-trait anxiety questionnaire[ICC= 0.39 to 0.89] before giving aerobic dancing as an intervention, at an intensity of 70-80% of maximum heart rate; by Borg scale(i.e. perceived exertion every week). Same samples were re-assessed for pain and anxiety at the end of 8 weeks. Results: Data was analyzed and it showed that it

was not a normal distribution, hence the data which passed normality was assessed by paired t-test(between the group) and which had not passed normality were assessed using Wilcoxin Signed rank test(within the group). It showedthat p-value of pain on activity using VAS is $p<0.0001$, while p-value of pain at rest is$p<0.0001$. The p- value of level of anxiety assessed using State-trait anxiety questionnaire is $p<0.0001$ which is highly significant. Conclusion: Study concludes that Aerobic Dancing reduced the intensity of pain and level of anxiety among adolescent females with Primary Dysmenorrhea. Keywords: Aerobic dancing, Primary Dysmenorrhea, Visual analogue scale, State-trait anxiety questionnaire.

Introduction:

Dysmenorrhea is aprevailing mainstream gynecological problem which usually affects females regardless their age and ethnicity. Also it has sufficient extent so as to incapacitate day-to-day activities1.It is commonly related with nausea, headache, fatigue and diarrhea. Pain usually starts the day before or in the first menstrual cycle day and disappears at the end of the menstruation.2 This disease affects 60% of females, with systemic symptoms such as headache (60%), low back pain, nausea and vomiting (80%), diarrhea (50%), irritability (30%) and adynamia (45%), among others.2The pain usually starts within 6 to 12 months of menarche.

Dysmenorrhea means painful menstruation of sufficient magnitude so as to undermine daily activities. Primary Dysmenorrhea is the one where there is no pelvic pathology. The occurrence of primary dysmenorrhea where it disrupts daily-to-day activities is about 15-20%. With the use of oral contraceptives and anti-steroidal anti-inflammatory drugs, there is marked relief of the symptoms.1The mechanism of commencement of pain is challenging to establish in primary dysmenorrhea, but the very few which are too often related is that, it is mostly related to adolescent females and their ovulatory cycles and to dysrhythmic uterine contractions and uterine hypoxia.2

The prevalence of dysmenorrhea among adolescent females ranges from 60 to 83 percent. Many adolescents reported limitations on daily activities, such as missing school, sporting events, and other social activities, because of dysmenorrhea. However, only 15 percent of females seek medical advice for menstrual pain, signifying the importance of screening 2 all adolescent females for dysmenorrhea.

In the past 30 years has been able to exercise and regular physical activity as an effective method in the treatment of primary dysmenorrhea should be considered.4Vasopressin increases uterine contractility and causing ischemic pain as a result of the vasoconstriction. The uterine pain is referred to the cutaneous distribution of lower abdominal wall in front, groin, upper and medial aspects of thighs at the knees, posteriorly to the sacral area and buttocks while that from the cervix to the lower sacral area.3

Latest indications suggest a certain physiologic source for primary dysmenorrhea and it relates to increased levels of prostaglandins, which leads to uterine contraction and ischemia (8, 9). Decreasing progesterone level during the luteal phase conveys about these raises, specifically ofPGF2αand PGE2. The role of prostaglandin synthesis inhibitors is, decreasing painful symptoms associated with menstrual discharge10.

In recent years, various pharmacologic methods have been used in the treatment of primary dysmenorrhea. Among the noninvasive methods of therapy, percutaneous electrical nerve stimulation and the use of vitamins can be named6. Women who engage in regular exercise seem to have reduced incidence of primary dysmenorrhea. These may be due to exercise related hormonal effects on the lining of the uterus, or in women who involve in regular exercise seem to have reduced occurrence of primary dysmenorrhea creased level of circulating endorphins.5

It seems that exercise acts as a nonspecific analgesic for short-term relief of pain. It is because exercise results in hormonal changes in the uterine lining7.Several studies have shown that the reduction of dysmenorrhea in women who regularly exercise may be due to effects of hormonal changes on uterine epithelial tissues or an increase in endorphin levels.5

Materials and Methods: The permission to conduct the study was taken from the concerned ethical committee. The purpose and intervention of the study was explained to the subjects who were willing to give consent to participate.Pre-treatment assessment of intensity of pain, and anxiety was taken by using Visual Analog ScaleVAS [ICC= 0.99, 95%CI 0.989 to 0.992] and State-trait Anxiety questionnaire [ICC= 0.39 to 0.89] respectively.

Exercise Protocol: The subjects were given Aerobic dancing as an exercise protocol for about 25-30 minutes, at an intensity of 70-80% of maximum heart rate; by Borg scale(i.e. perceived exertion every week) for 3 times a week for about 8 weeks. 10 minutes warm-up included active upper and lower limb

exercises. The session included a series of aerobic dance of 15-20 minutes on music which incorporated:

Knee kicks

Marching

Side steps

Knee lifts

Step tap

"V" step

Knee lift

Lunge side and back

Indoor boosted walking

10 minutes of cool down was also included for relaxation.
A control group of 50 subjects was included similarly on the basis of the inclusion and exclusion criteria who weregiven conventional exercises of the following:

Lower limb muscles stretching

Back muscles Stretching

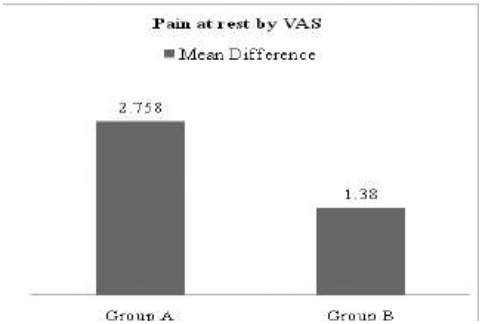
Abdominal muscles stretching

After 8 weeks (2 menstrual cycles) of protocol, pre and post intervention difference was noted and data was analyzed statistically.

Results:

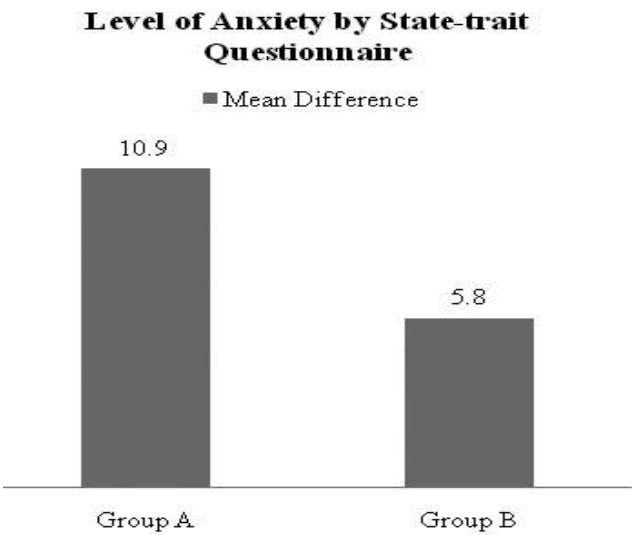
Intensity of pain by Visual Analog Scale:

Pain intensity by	**Pre (Mean±SD)**	**Post (Mean±SD)**	**Mean Difference**
VAS on activity			
Group A	7.549±1.083	4.725±0.8504	2.82
Group	6.62±1.51	5.46±1.29	1.16



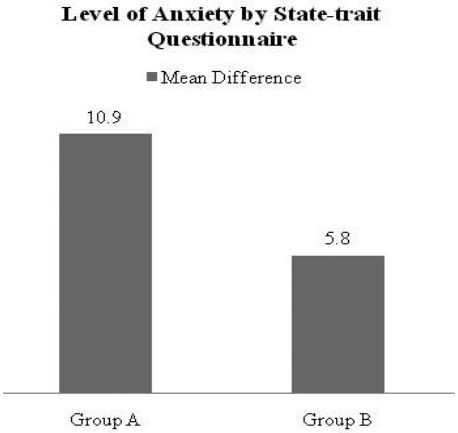
Interpretation- Thegraph is the representation of comparison of mean differences of Group A and Group Bof intensity of pain on activity. The mean difference of group A is 2.82 and of group B is 1.16 with p-value of p<0.0001 which is highly significant.

Pain intensity by VAS at rest	Pre (Mean±SD)	Post (Mean±SD)	Mean Difference
Group A	6.681±1.03	3.923±1.043	2.758
Group B	5.562±1.53	4.182±0.842	1.38



Interpretation- The graph is the representation of comparison of mean differences of Group A and Group B of intensity of pain at rest. The mean difference of group A is 2.758 and of group is 1.38 with p-value of p<0.0001 which is highly significant.

Level of anxiety by State-trait anxiety questionnaire	Pre (Mean±SD)	Post (Mean±SD)	Mean Difference
Group A	62.55±6.17	51.65±6.17	10.9
Group B	49.18±6.12	43.38±6.13	5.8



The graph is the representation of level of anxiety by State-trait anxiety questionnaire.The mean difference of group A is 10.9 and of group B is 5.8 with p-value of $p<0.0001$ which is highly significant.

Discussion:Primary dysmenorrhea is health relatedproblem within adolescent females with high occurrence affecting different aspects of their life and their productivity. Dysmenorrhea is a gynecological ailment which is considered by lower abdominal pain which may spread to thighs and top and bottom of the spine.6

The present study was undertaken in a motive to see the efficacy of aerobic dancing in reducing pain and anxiety in primary dysmenorrhea.Subjects usuallyuse various methods such as rest, warm bath, or medicines to reduce menstrual pain. Hence, we decided to reduce pain by means of non-pharmacological way such as aerobic dancing.

In this study the mean difference of pain on activity using VAS of group A is 2.82 and of group B is 1.16 with p-value of $p<0.0001$ which is highly significant. Physical activity such exercises and aerobic dancing increase blood flow and metabolism of uterus which states that increasing metabolism is an

important for decrease of menstrual symptoms. The results thus concur with the study done by Kiranmayi et al9 and also with results revealed by Shahr-Jerdy et al [1, 10]

The mean difference of pain at rest using VAS of group A is 2.758 and of group B is 1.38 with p-value of $p<0.0001$which is also highly significant. While comparing the results of both Groups A and B, the study states that aerobic dancing had better effect in reducing pain and anxiety in primary dysmenorrhea when compared with conventional exercises, thus the results accord with the study done by Sutar et a.l11 on the effect of aerobic exercises on primary dysmenorrhea

.The level of anxiety felt as menstrual symptom during primary dysmenorrhea was assessed using State-trait anxiety questionnaire. The mean difference of group A is 10.9 and of group B is 5.8 with p-value of $p<0.0001$ which is highly significant. Physical activities act as a specific anti-pain and can cause reduction in primary dysmenorrhea by reducing anxiety and mental stress14. Related result was also found by Israel, R.; Sutton, M. that aerobic exercise lessens the physical and psychological symptoms effectively13 Regular aerobic exercise has many profits, which includes increasing the strength for women's heart vascular activity, increasing the bone density, and reducing the stress eventually3,9.

Jahromi et al. conducted a study to see the effect of weight training exercises on the symptoms of menstrual cycle in over 250 students of Shiraz University in one group before and after doing the exercises. The results indicated that the intensity of dysmenorrhea considerably decreased after doing the exercises when compared to the beginning of the study18.

Aerobicdance training and performing comprises a combination of high and low intensity exercise with intermittent resting, as a contrast to constant moderate activity over long time. Many dance disciplines are not 'aerobic' and do not share the high energy expenditure of many other athletic pursuits3.

Aerobic dancing is found to be beneficial in reducing pain and menstrual symptoms. It is considered that the pain during menses is due to prostaglandins' which are in high quantities in menstrual fluid.11 Menstrual pain probably stems from increased contraction of the uterine muscle, which is innervated by the sympathetic nervous system. Stress tends to enhance sympathetic activity, and may therefore increase menstrual pain by exacerbating uter-

ine contraction. By relieving stress, exercise may decrease this sympathetic activity, thereby alleviating symptoms. The intensity of dysmenorrhea has been revealed to be higher in the women with more stress, and doing exercises has been said to be effective in the decrease of stress[19, 20, 21].Menstrual pain may be resulted from increased

Leptin, a hormone secreted from fat cells and controls the metabolism of the hypothalamus–pituitary–gonads and thus plays a significant role in reproduction. Few studies state that physical activity reduces the amount of leptin in blood to 30-34%.15 Hood and Dincherrecommended a program of exercise for an individual suffering from dysmenorrhea2-3 times a day before the commencement of the menstrual cycle. They recounted that exercises decreases pain during menstruation by soothing abdominal muscles and also releases pressure on the nerve centers, pelvic organs and helps in relieving pelvic congestion16

It is presumed that primary dysmenorrhea intensifies uterine muscle contractions and nerve activity of the sympathetic nervous system, resulting in decrease of the sympathetic activity, causing aerobic activity toreduce stress. Aerobic dancing increases the release of endorphins to the brain, which can elevate the pain threshold. Some studies have even recommended that the upsurge in uterine blood flow and metabolism in aerobic activities can be effective in reducing the symptoms of dysmenorrhea22.The aerobic training takes efforts to fasten the transfer of prostaglandin to the uterus which in return helps to reduce symptoms of dysmenorrhea23.

The present study used ananxiety questionnaire which helped to identify the level of the anxiety felt during primary dysmenorrhea their intensity. However, most of the above mentioned studies have only taken into consideration primary dysmenorrhea as uterine cramps and used VAS for assessing the intensity of pain. The present work showed that aerobic dancing had positive effects on relieving menstrual symptoms.

Impending studies are suggested to assess theparticipants' psychosomatic as well as psychological variables and various other social factors, so that the outcome will be more suggestive of the effects of aerobic dancing on the intensity pain, anxiety and other stresses of primary dysmenorrhea.

Dysmenorrhea, as a significant problem for females, causes absenteeism from school, college and work, hence we suggest aerobic dancing as a regular

exercise as a cost effective means in this age group in reducing the menstrual symptoms.

Conclusion:

From this study, we found that aerobic dancing is effective in reducing pain and anxiety felt during primary dysmenorrhea. Hence, aerobic dancing can be integrated as one of the non-pharmacological method to reduce menstrual symptoms during primary dysmenorrhea.

Acknowledgement: We extend our gratitude towards the participants for their consent and co-operation for the study.

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Effectiveness of neurodynamic sliders and static stretching on hamstring muscle in normal healthy individuals with hamstring tightness: A comparative study

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ABSTRACT

Background and Aim

The Neurodynamic sliders technique has been shown to improve hamstring flexibility. It targets the neural tissue rather than only the muscle tissue . The aim of this study is to compare the effects of NDS (Neurodynamicsliders) and static stretching on hamstring flexibility. Flexibility is considered important for general health and fitness.

Methodology

An experimental study was carried out wherein 60 individuals selected by random sampling by Active Knee Extension test (AKE) were divided in two groups, (30 each) one received NDS and the other received static stretching. 3 times per week for 4 weeks and the AKE was repeated in the 4th week to record results.

Result and conclusion

The study suggests that there is a statistically significant difference for an increase in hamstring flexibility in participants with static stretching as well as with NDS . The comparison between the two indicates that both of them are equally effective.

Keywords: Neurodynamic sliders, Hamstring, Acive knee extension test

INTRODUCTION

Reduced flexibility could be due to postural adaptations, scarring, muscle spasms or contraction.

There are various techniques improving hamstring flexibility like static stretching, PNF, MET etc. The Neurodynamic sliders technique is one such technique. It is a method of producing sliding movement of neural structures relative to the mechanical interfaces. It provides tension on the targeted nerve proximally via joint movements while releasing tension distally.

Passive stretching also used to improve hamstring flexibility is a technique where a therapist provides a sustained end range stretch in Stretching has been conventionally used to improve hamstring flexibility in individuals with hamstring tightness. The effect of Neurodynamic sliders which work on the excursion of the neural tissue and the surrounding connective tissue The most effective intervention of a very common condition such as hamstring tightness in the age group of 18-25 mainly consisting of students where prolonged sitting increases tightness.

Methodology

Study design : Experimental study
Sampling : Purposive Random Sampling
Sample size : 60

Inclusion criteria

Subjects in the age group of 18-25years Subjects having knee extension < 160 degrees by AKE test.
Gender: Male & female

Exclusion criteria

Injury to the hamstrings within the past 1 year, Diagnosis of Low back pain in the last 6 months, Lumbar Radiculopathy, Recent Fractures

MATERIALS

Universal goniometer

Plinth
Stool

PROCEDURE

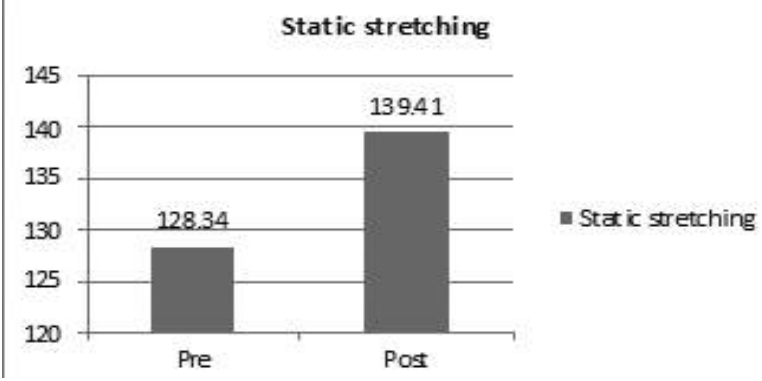
An experimental study was done in subjects with hamstring tightness.. An informed consent was then taken. They were screened by the Active Knee Extension test. The Active Knee extension test (AKE) – The subjects were positioned on a plinth with both legs extended. Anterior superior iliac spines were positioned by aligning them with the vertical. The lower extremity not measured was stabilized using a strap across the thigh.

The participants were told to flex the dominant hip until the thigh touched the horizontal surface of the stool .While maintaining the contact between the thigh and horizontal surface, participants were asked to extend the leg as much as possible while keeping their foot relaxed and to hold the position for about 5 seconds.

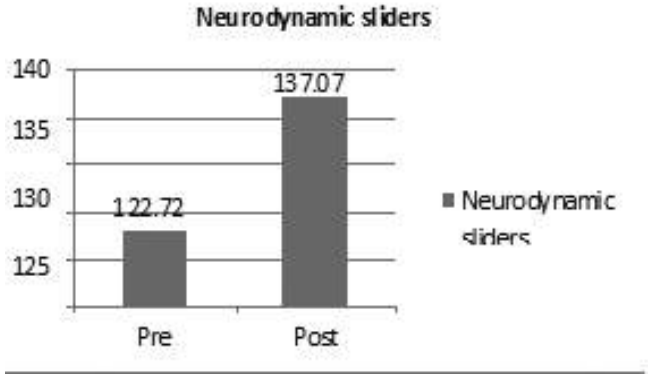
A standard universal goniometer was placed on the lateral epicondyle of knee, and the goniometer arms were aligned along the femur and fibula. Hamstrings were considered tight for extension and ankle dorsiflexion. This set was performed for 60 seconds with 10 seconds rest. The spine is straightened in the rest period to avoid any backpain. Total 5 sets were done in one session and 3 sessions/week were done for 4weeks.The second group received static stretching to the dominant leg for 30 seconds with 10 seconds rest, repeated 5 times. 3 times/week for 4 weeks.

The participants were then randomly divided into two groups one group received the NDS technique on the sciatic nerve of the dominant leg. The technique started with the subject in high sitting, maintaining a thoracic slump, both hands clasped posteriorly at lumbosacral level, feet unsupported followed by alternating sets of movements of Cervical flexion, knee flexion and ankle plantarflexion and cervical extension, knee

Out of 60 subjects screened, 58 subjects completed the entire protocol (2 dropouts). Paired t test was done to compare the pre and post results of static stretching and NDS. Both static stretching and neurodynamic sliders were effective in increasing the hamstring flexibility individually. ($p < 0.0001$) which is considered to be extremely statistically significant.
An unpaired t test was then done to compare between static stretching and neurodynamic sliders technique. The difference was considered not quite statistically significant ($p=0.0658$). Thus both were equally effective in increasing the



hamstring flexibility.



Graph no. 1 Above graph shows pre and post data of NDS intervention

Graph no. 2 Above graph shows pre and post data of static stretching

DISCUSSION

The present study compared static stretching and neurodynamic sliders to improve hamstring flexibility. Neurodynamic sliders and static stretching were individually very effective ($p < 0.0001$) which is extremely significant. When compared, both were equally effective. ($p = 0.658$). Which is not quite statistically significant

The increase in hamstring flexibility could be due to the subject's reduced tolerance to stretch applied. Mechanosensitivity is the ease with which neural tissue becomes active after application of a mechanical stimuli. The more mechanosensitive the nerve is the more intense is the response .The NDS

has been proposed to decrease this mechanosensitivity thus neural tissue can glide easily. The body is a container of nervous system in which the musculoskeletal system presents a mechanical interface to the nervous system. The

Mechanical interface consists of anything that resides next to the nervous system such as tendon, muscle, bone, ligaments, fascia and blood vessels. The nervous system is contained within this interface and follows the movements of the interface thus producing relative sliding. This sliding of the nerve along the nerve beds and fascial system which includes the hamstrings muscles may have led to elongation of the hamstrings.

A study titled effect of hamstring muscle extensibility,muscle activity and balance on different stretching techniques conducted as a one time session concluded that static stretching improved hamstring flexibility.

Weppler and Magnuson stated that the effect of stretching in increasing the hamstring extensibility could be due to the changes in the individual's perception of stretch or pain. Thus studies supporting both neurodynamic sliders and static stretching as individual interventions increasing hamstring flexibility were confirmed. In the present study we compared Neurodynamic sliders and static stretching with the aim to find the most effective technique to improve hamstring flexibility.

CONCLUSION

Neurodynamic sliders and static stretching both effective in increasing hamstring flexibility in individuals with hamstring tightness.

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"Comparative Study of Six Minute Walk Test And Three Minute Step Test For Measuring Functional Endurance In Young Adults"

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BACKGROUND AND OBJECTIVES:

Functional endurance is the act, quality or power to withstand stress. It is the ability to deal with pain or suffering that continues for a long time. Various tests are used to check endurance. This study includes comparison between two tests i.e. 6MWT and 3MST.

METHODS: The study was conducted in TMV College of Physiotherapy which included30 sample of young adults, both males and females. The participants were asked to perform 6 minute walk test and 3 minute step test and their pre and post heart rate was measured. Scoring was done according to the interpretations of scores and data which was analyzed by using unpaired T test for proportionality.

RESULT: A total of 30 students were included in the study. 15 were males and 15 were female. The values were compared according to the objectives and the statistical analysis was done. The Six Minute Walk Test And Three Minute Step tests when they were compared it shown p value of 0.000 which was highly significant.

CONCLUSION: This study concludes that the cardiovascular endurance in physiotherapy students and rate of perceived exertion was more in 3minute step

test than 6 minute walk test.

KEYWORDS:6 minute walk test(6MWT), 3minte step test(MST), Heart rate(HR), Volume of maximum oxygen uptake(VO2max), Pulse rate(PR).

INTRODUCTION

Cardio respiratory endurance, sometimes called as cardio endurance, aerobic fitness, or aerobic capacity, is one of the basic components of physical fitness. Physical fitness is required not only by athletes for better performance, but also by non-athletes for maintenance of a healthy body and healthy mind fitness is generally considered to have five components: cardiovascular endurance, muscle strength, muscular endurance, flexibility, and body composition hence, when physical fitness is tested, the functional status of all the systems is actually being checked.1

The goal standard for measurement of cardio respiratory fitness is the maximal rate of oxygen uptake (VO2 max). VO2max is the rate at which an individual is able to consume oxygen. Cardiorespiratory fitness is influenced by several factors including age, sex, genetics, and health status. Cardio respiratory fitness is a condition in which the body's cardiovascular (circulatory) and respiratory system function together, especially during exercise or work, to ensure adequate oxygen is supplied to the working muscles to produce energy. cardio respiratory fitness is needed for prolonged, rhythmic use of body's large muscle groups.1

Functional endurance is the act, quality or power to withstand stress. It is the ability to deal with pain or suffering that continues for a long time i.e.to sustain stressful activity or effort. The sub- maximal exercise test is a test with progressively increasing work rates using exercise equipment, such as a bike or a treadmill, until volitional fatigue occur determining maximal oxygen consumption. The purpose of sub maximal exercise test is to assess the peak rate of oxygen consumption, anaerobic threshold and cardiopulmonary function.2

The functional endurance is a classification of exercise which involves training the body for the activities performed in daily life. In order to benefit the health of an individual from physical fitness, an unknown response in a person called as stimulus can be triggered by endurance. Endurance increases breathing and heart rate. These activities keep an individual healthy and improve the fitness and help to perform tasks that are needed for daily work.

Endurance exercise improves the health of heart, lung and circulatory system. They also delay or prevent many diseases that are common in older adults such as diabetes and heart diseases.2

The six minute walk test (6MWT) has been devised as a practical sub maximal test, measuring the distance that patients walked on a flat hard surface over a period of six minutes as a reflection of their functional capacity. This test is a self paced exercise test which is commonly used in clinical settings as a single measurement of physical functional status and as an outcome measurement of the response to treatment interventions in patients with moderate to severe heart or lung disease. It is a simple test that measures the distance walked during a defined period. The six minute walk test is a sensible compromise and is currently the most commonly used walk test. 2

The 3 minute step test is another outcome measure which is simple but objective method to indicate the cardiovascular endurance of an individual. The 3 minute step test measures the aerobic fitness level based on the return of the heart rate to normal after exercise. Nevill A in September 2011 aimed to stusy the validity and reliability of 3 minute step test. Person coefficient produced a very good linear relationship between trial i.e.r=0.9983

NEED OF STUDY

Physical fitness is one of the most important health markers, as well as a predictor of morbidity and mortality for cardiovascular disease. To avoid the further complications in future one has to be physically fit. For this the 6 min walk test and 3 minute step test will be compared and the result will tell us which test is better for measuring the functional endurance.

AIMS AND OBJECTIVES

AIM: To perform a comparative study between 6 minute walk test and 3 minute step test to measure functional endurance.

OBJECTIVES:

To measure cardiovascular endurance in physiotherapy students.
To find the rate of perceived exertion.
To find difference between the endurance in males and females.

REVIEW OF LITERATURE

ENRIGHT PL (2003) studied on the theory of 6 minute test. The study showed ATS guidelines for 6 minute walk test. Where 6 minute walk test is considered safer and easier to administer better tolerated and best reflex ADL's then other walk test. When conducting the 6 minute walk test, do not walk with the subject and do not assist the subject. The subject should walk alone and not with other subjects. Use standardized phrases while talking to the subject because encouragement and enthusiasm can make difference upto 30% .

FARDY PS, et al (2003) studied The 3- minute step test in obese youth: reproducibility, validity, and prediction equation to assess aerobic power. 52 girls and 45 boys, ages 7- 17.8 participated in the study. Three step tests were administered 1 week apart. The 3 minute step test was performed on two occasions 1 week apart to assess reproducibility. In obese youth, the 3 minute step test is a reproducible and valid test for assessing aerobic power. A prediction equation was developed to estimate VO2 max, using number of steps in 3 minute step test and Body mass index.

JENKINS S, et al (2006) studied on 6 minute walk test in healthy individuals aged 55 to 75 years. The study included 70 subjects who performed three test using a standardized protocol where 6 minute walk test was defined as greatest distance achieved from the three other test. The average 6 minute walk test was 659+/- 62 m (range 484-820m). The study concluded 6 minute walk test in healthy population is an exercise test in pulmonary rehabilitation where height and FEV1 are identified as independent predictors.

WONG E et al (2007) studied on standard reference for 6 minute walk test in healthy children aged 7-16 years. The main objective of the study was to construct height specific standard for 6 minute walk test aged 7 to 16 years. The anthropometric data, spirometric lung functions and 6 minute walk test of 1445 chinese children were measured using standard protocol, where the study analysis revealed height anddifference in heart rate before and after the walk test are important clinical variables associated with 6 minute walk test.

OSSES AR, et al (2010) studied reference values for the 3 minute step test in healthy subjects of 20-80 years old. 175 healthy volunteers aged 20-80 years (98 women) with normal spirometry and without history of respiratory, cardiovascular or other diseases that could impair stepping capacity. The test

was performed twice with an interval of 30 minute. Heart rate, arterial oxygen saturation (with a pulse oxymeter) and dyspnea were measured before and after the test. Our results provide reference equations for 3 minute step test that are valid for healthy subjects between 20 and 80 years old.

D'SILVIA C, et al (2012) studied 3 minute step test-normal values of school children aged 7-12 in India: a cross sectional study. Healthy children aged between 7 to 12 years were recruited randomly from the selected schools in India. 400 children were included. 3 minute step test was performed according to standardized ATS guidelines. Steps in 3 min, Heart rate (HR), Blood pressure (BP), Oxygen saturation, anthropometric measurements and level of dyspnea were taken as outcome measures. In this study, the men steps in 3 minute by boys was 670.74 ±86.21 and girls were 548.93 ± 44.78.

SHELLECK M, et al (2013) studied on 6 minute walk test performance in young children who are normal weight and overweight. 70 children, 5-9 years of age, participated in this study. The 6 minute walk test was performed better on an indoor walkway. Heart rate(HR), blood pressure(BP), and oxygen saturation (SaO2) were measured. A self –reported questionnaire was completed by parent/guardian. The children who were overweight had higher systolic BP and lower SaO2 levels at rest and post- 6 minute walk test.

MATERIALS AND METHODOLOGY

STUDY DESIGN	: Comparative.
STUDY SETTING	:Students of TMV College of Physiotherapy,Pune.
SAMPLE SIZE	: 30.
STUDY DURATION	: 6 months.
TARGET POPULATION	:Physiotherapy students.
OUTCOME MEASURE	: 6 minute walk test and 3 minute step test.
SAMPLING TECHNIQUE	: Randomized.
INCLUSION CRITERIA	: Males and Females will be included.
	Age group – 20- 23.
EXCLUSION CRITERIA	: Any musculoskeletal injury.
	Any cardiovascular problem.
	Any injury to the lower extremity in last 6 months.

MATERIALS

Consent form.
Evaluation form.
Stop watch.
12 inch stepper.
Sphygmomanometer.
Chair.
Pen.
Record form.

PROCEDURE

Ethical clearance was obtained from the institutional sub ethical committee. Students were selected from TMV College of Physiotherapy according to the inclusion and exclusion criteria.Written informed consent was taken from the subjects.

The study included 30 samples which were chosen randomly.
A systemic evaluation of musculoskeletal and respiratory system was carried out.
Individuals satisfying the inclusion criteria and co-operative individuals were included in the study.
Participants were explained about the study.
Consent was taken from the subjects.
The vitals wastaken of the subject and the subject were asked to perform 6 minute walk test under the guidance and post vitals was recorded.
After a short rest period, again vitals were recorded and subject were asked to perform 3 minute step test under the guidance and post vitals was recorded.
The rate of perceived exertion was measured using the Borg Scale.

TESTS PERFORMED:
SIX MINUTE WALK TEST:

Instructions to the Participant:

The objective of this test is to walk for 6 minutes. You will have to walk back and forth in the hallway. 6 minutes is a long time to walk, so you will be exerting yourself. You will probably get out of breath or become exhausted. You are permitted to slow down, to stop, and to rest as necessary. You may lean against the wall while resting, but resume walking as soon as you are able.

You will be walking back and forth around the markings without hesitation. Now I am going to show you. Please watch the way I turn without hesitation. We will avoid having a conversation so that you can save your wind for walking. You can begin when I say 'go'.

Guidelines for the tester:

Do not walk with the participant, however if balance is an issue, the tester may walk behind and to the side. After the first minute, tell the participant the following (in even tone): "You are doing well. You have 5 minutes to go." Repeat this message at every minute (4, 3, 2,1). Do not use other words of encouragement (or body language to speed up). If the participant stops walking during the test and needs a rest, say this: 'You can lean against the wall if you would like; then continue walking whenever you feel able.' Do not stop the timer. If the participant stops before the 6 minutes are up and refuses to continue, discontinue the walk, and note on the worksheet the distance covered, the time stopped, and the reason for stopping prematurely.

At the end of the 6 minutes:

Have participant sit down on the chair.
Immediately take vital signs, starting with heart rate.
Calculate and record the distance walked (in laps).

THREE MINUTE STEP TEST:

Step up and down for 3 minutes.
Immediately after 3 minutes of stepping, participant will be asked to sit down.
A 60 second heart rate will be taken after the completion of stepping.
The score will be 60 second pulse rate following three minutes of stepping.

SAFETY:

Before and after the test monitor the vital signs. If there is an unexpected vital sign response, continue monitoring and documenting every 5 minutes until systolic blood pressure and heart rate returns to within values.

STATISTICAL ANALYSIS AND INTERPRETATION

The statistical test used for the analysis of result were :

Unpaired t-test.

Mean and standard deviation were carried out for all the groups in this study for both the groups. Following statistical formulae were used for analysis:

$$\textbf{MEAN} = \frac{\sum Xi}{n}$$

Where,

$\sum Xi$ =Sum of total readings

n = number of samples

Standard Deviation (SD) = $\sum (Xi - X)2$
$n - 1$

Where,

Xi = Individual values

$\bar{X}$ = Mean

n = number of samples.

Unpaired t – test was applied to compare the pre and post values in between the two groups.

Formula for calculation of data by unpaired t-test is

$$t = \frac{\bar{X}(1) \quad \bar{X}\ 2}{\sqrt{(SD1\text{^}2/n + \quad SD)\ 2\text{^}2/n}}$$

X1- Mean value of first sample
X2 – Mean value of second sample
SD1- Standard Deviation of first sample
SD2- Standard Deviation of second sample
n1- sample size of first group
n2- sample size of second group

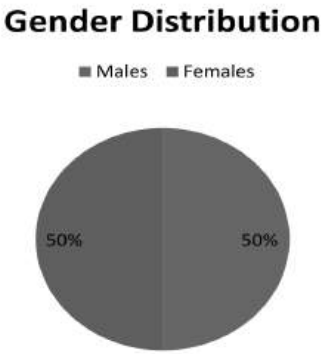
Paired t-test was applied to compare pre and post values within the group for both groups.

Formula for calculation of data by paired t-test is

$$t = \frac{\sum d}{\sqrt{Nd2-(\sum d)2/\ N-1}}$$

Where, $\sum d$ = The total number of difference
$\sum d2$ = The total of the difference squared
$(\sum d)2$ = Total number of the squared difference
N = Total number of samples.

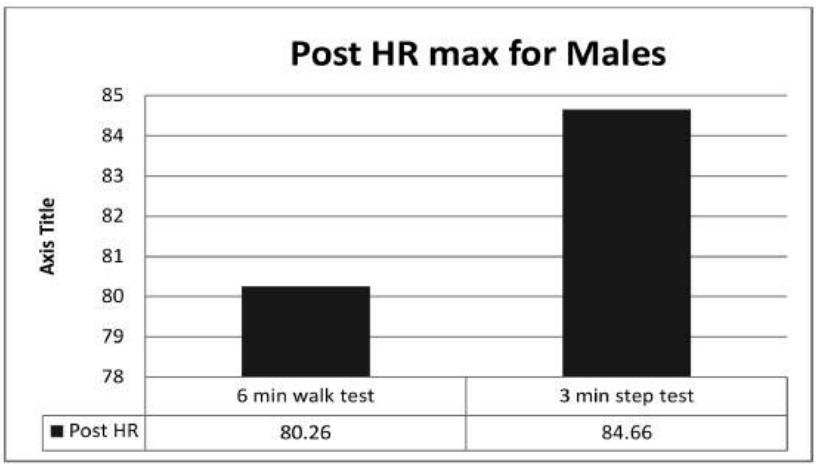
GRAPH 1:GENDER DISTRIBUTION:



Interpretation : Out of 30 samples 15 were males and 15 were females.

Graph 2: Post Heart rate of males:

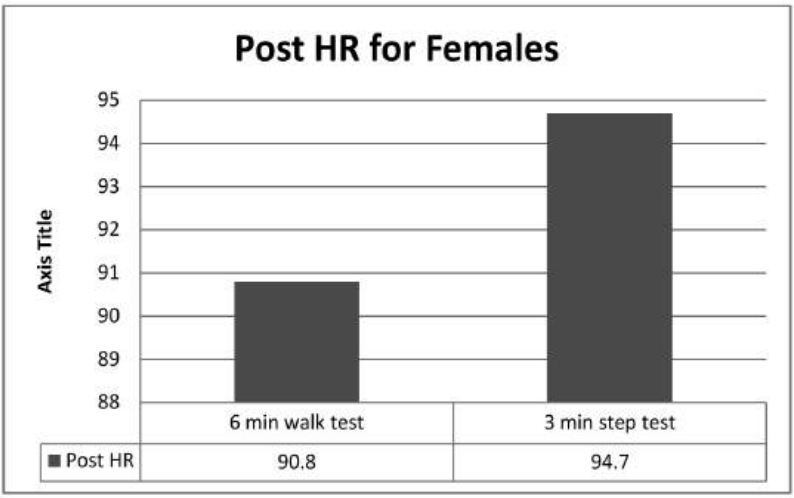
Post Heart Rate	MEAN	SD	UNPAIRED T-TEST
6 minute walk test	80.27	4.832	t = -2.611
3 minute step test	84.66	4.386	P =0.014
Difference	-4.4	0.446	



Interpretation: There was significant increase in Post Maximum Heart Rate in Males who performed 3 min step test than Males who performed 6 min walk test.

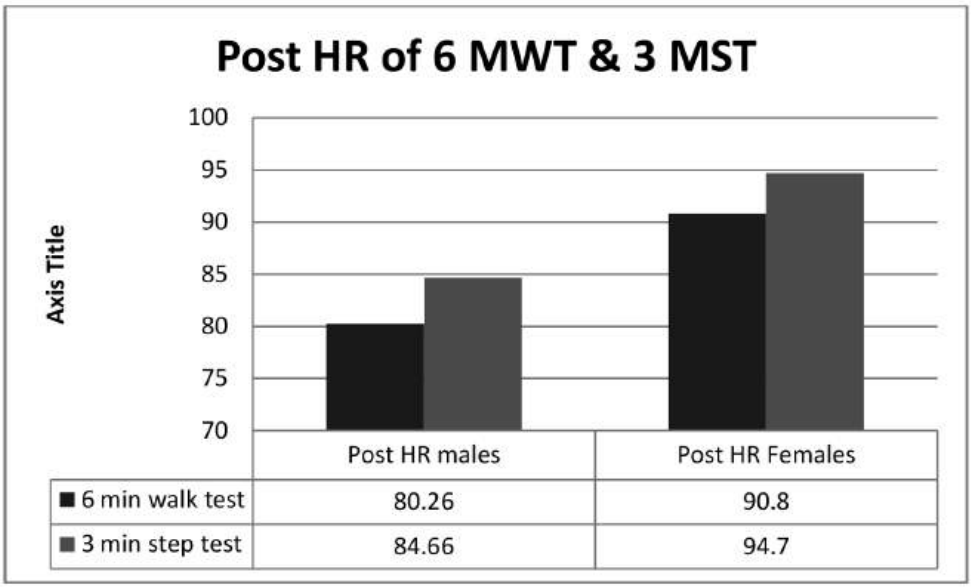
Graph 3: Post Heart rate of Females:

Post Heart Rate	MEAN	SD	UNPAIRED T-TEST
6 minute walk test	90.8	1.971	t = -4.633
3 minute step test	94.73	2.631	P =0.000
Difference	-3.933	-0.66	



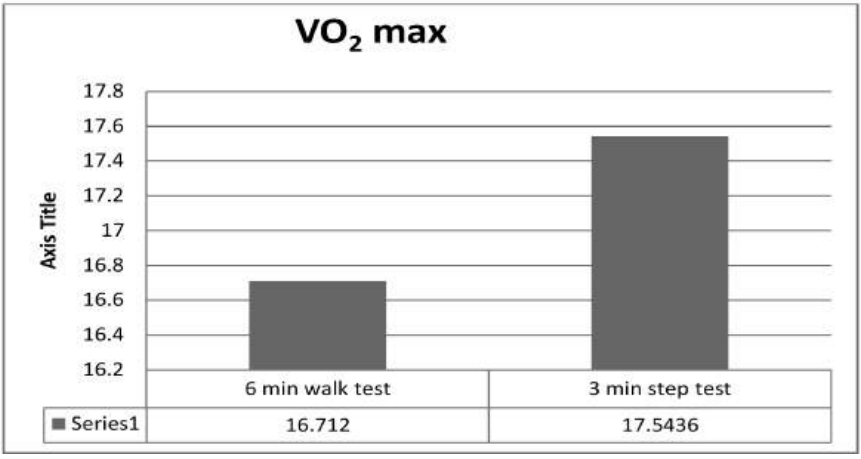
Interpretation: There was significant increase in Post Maximum Heart Rate in Females who performed 3 min step test than Females who performed 6 min walk test.

Post Heart Rate	MEAN	SD	T-TEST
6 minute walk test	85.53	6.469	t = -9.835
3 minute step test	89.7	6.232	P =0.000
Difference	-4.167	-2.321	



Interpretation: There was significant increase in Post Maximum Heart Rate in both Males and Females who performed 3 min step test than Males and Females who performed 6 min walk test.

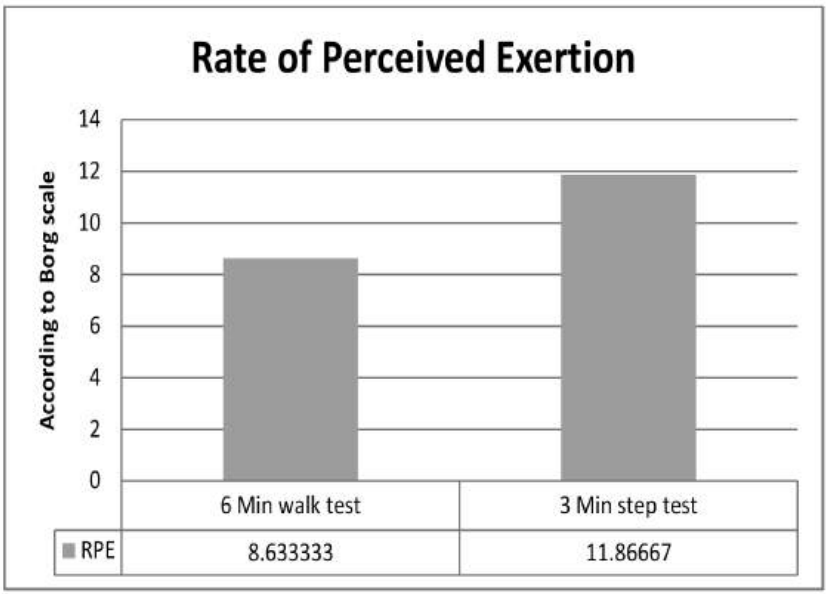
Graph 5: Maximum volume of oxygen intake (V02max) in 6 minute walk test & 3 min step test.



Interpretation: There was significant increase in Maximum volume of oxygen intake (VO2max) in 3 min step test than 6 min walk test performed by the subjects.

Graph 6: Rate of Perceived exertion in 6 minute walk test & 3 min step test:

Post Heart Rate	MEAN	SD	T-TEST
6 minute walk test	8.633	1.474	t = -12.174
3 minute step test	11.87	2.33	P =0.000
Difference	-3.233	1.455	



Interpretation:Rate of Perceived Exertion was more in 3 minute step test than 6 minute walk test performed by the subjects.

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ANNEXURE

ANNEXURE I- CONSENT FORM

Title:-**"COMPARATIVE STUDY OF 6 MINUTE WALK TEST AND 3 MINUTE STEP TEST FOR MEASURING FUNCTIONAL ENDURANCE IN PHYSIOTHERAPY STUDENTS"**

PARTICIPANTS: - I confirm that Dhanashree P. Shinde has explained me the purpose of the research, the study procedure and possible risk and benefits that I may experience. I have read and understood this consent to participate as a subject in this research project.

Name:- Date:-

Signature:-

INVESTIGATOR:-

I have explained to _____ the purpose of the project, the procedure required and the possible risk and benefits to the best of my ability. I have made every efforts to make participant understand and clear all questions put forward.

Date:

ANNEXURE II- EVALUATION FORM

1. NAME
2. AGE
3. GENDER
4. PAST HISTORY
5. ON EXAMINATION

-VITALS
-POSTURE
-GAIT
-ANY DEFORMITY/SHORTENING/WASTING

6. ON TESTING

-RANGE OF MOTION
-MMT

ANNEXURE III- PROFORMA

6 MINUTE WALK TEST:
Pre vitals: Blood pressure - Heart rate- Respiratory rate-
No. of laps:
Post vitals:

	Immediate	After 1 minute	After 3 minutes	After 6 minutes	After 9 minutes
Blood Pressure					
Heart rate					
Respiratory rate					

Interpretation of score-

3 MINUTE STEP TEST:
Pre vitals: Blood pressure- Heart rate- Respiratory rate-
No. of steps :
Post vitals:

	Immediate	After 1 minute	After 3 minutes	After 6 minutes	After 9 minutes
Blood Pressure					
Heart rate					
Respiratory rate					

Interpretation of score-

INTERPRETATION OF SCORE

<97	Excellent
97-127	Good
128-142	Fair
143-171	Poor
172+	Very poor

MASTERCHART

SR.NO	AGE	GENDER	6 MINUTE WALK TEST						3 MINUTE STEP TEST						RPE
			PRE VITALS			POST VITALS			PRE VITALS			POST VITALS			
			BP	HR	RR	BP	HR	RR	BP	HR	RR	BP	HR	RR	
1	22	M	108/72	70	17	112/78	76	20	108/72	70	17	120/80	82	24	9
2	22	M	110/72	72	18	118/78	76	20	108/72	72	18	120/80	82	26	9
3	21	M	107/70	72	16	112/74	78	22	107/70	72	16	122/80	84	26	9
4	22	M	110/70	70	17	114/76	78	22	110/70	70	17	118/80	82	24	9
5	23	M	106/70	70	17	114/78	78	22	106/70	70	17	120/80	82	26	11
6	22	M	108/72	70	16	116/80	76	22	108/72	70	16	120/82	78	26	11
7	20	M	110/72	70	17	116/78	76	23	110/72	70	17	116/80	82	26	11
8	20	M	108/72	74	16	114/78	78	23	108/72	74	16	118/80	80	25	11
9	20	M	110/70	72	16	112/80	76	21	110/70	72	16	118/82	82	20	9
10	20	M	114/74	78	17	118/80	84	24	114/74	78	17	120/82	88	26	9
11	21	M	110/70	82	16	116/76	88	25	110/70	82	16	120/80	92	26	11
12	21	M	116/78	82	16	122/82	86	24	116/78	82	16	124/84	90	26	11
13	22	M	118/76	86	16	122/80	90	26	118/76	86	16	122/80	92	27	11
14	22	M	116/70	78	17	120/80	84	23	116/70	78	17	122/82	88	26	9
15	20	M	110/70	76	16	120/82	80	22	110/70	76	16	122/82	86	26	9
16	23	F	120/80	82	16	124/84	90	24	120/80	82	16	124/84	94	26	13
17	23	F	120/82	86	17	124/86	90	23	120/82	86	17	124/86	96	26	11
18	22	F	114/80	84	16	120/80	90	24	114/80	84	16	124/82	94	25	15
19	20	F	112/70	72	15	120/78	88	24	112/70	72	15	122/80	94	26	13
20	20	F	114/72	74	16	118/80	86	23	114/72	74	16	124/82	92	26	15
21	20	F	116/80	84	17	122/80	94	24	116/80	84	17	124/82	89	27	13
22	22	F	116/76	84	17	121/80	92	24	116/76	84	17	122/82	96	27	11
23	23	F	120/80	78	17	124/80	90	24	120/80	78	17	124/80	92	27	15
24	22	F	116/76	86	18	122/82	92	23	116/76	86	18	122/82	94	27	15
25	22	F	118/80	84	18	122/82	92	26	118/80	84	18	122/84	96	27	15
26	22	F	120/80	82	16	122/84	90	25	120/80	82	16	122/82	94	26	13
27	23	F	118/80	84	16	122/80	92	25	118/80	84	16	124/82	96	27	15
28	23	F	118/76	82	18	122/80	92	24	118/76	82	18	122/80	96	27	13
29	22	F	122/80	88	17	124/84	92	25	122/80	88	17	124/84	100	28	15
30	22	F	116/78	82	16	120/82	92	25	116/78	82	16	122/84	98	27	15

Management of Dysmenorrhea Across Disciplines: A Literature Review

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Abstract:
Background:

Dysmenorrhea is the leading cause of recurrent short-term school absence in adolescent girls and a common problem in women of reproductive age. Primary dysmenorrhea is defined as cramping pain in the lower abdomen occurring just before or during menstruation, in the absence of other diseases such as endometriosis etc. Prevalence rates are as high as 90%. Initial presentation of the primary dysmenorrhea typically occurs in adolescence girls. Commonly improves with the age, parity and management of stress.Methodology: The aim at this study is determining the concepts and definition of treatments of primary dysmenorrhea according to previous studies. Databases were searched for evidence of available management of dysmenorrhea from different approaches of treatment. At first, all trials related to keywords searched for English databases including; Google, Google scholar, PubMed Database of Systematic Reviews covering the period from 2010 through 2020. Considering inclusion and exclusion criteria, articles related to treatments of primary dysmenorrhea were found and analyzed. Papers related to treatment of primary dysmenorrhea, in English, of original type and free full texts were included for review. The PRISMA guidelines were referred to for the review.Results: 80 relevant studies were identified. Among which 50 articles were included. All the studies showed significant effects for management of dysmenorrhea. But there were very few studies available where physiotherapy combined with other treatment approach.Conclusion: A holistic treatment approach needs to be evolved using an interdisciplinary approach among the different health sciences, to allow for best possible care of women suffering from the condition.

Key words: Dysmenorrhea management, physiotherapy, Yoga, Ayurveda, Modern medicine, Homeopathy.

Introduction

Dysmenorrhea is the leading cause of recurrent school and workplace absence in 90% girls and reproductive age women.[1]Primary dysmenorrhea is defined as cramping, coliky pain in the suprapubic region radiating to thigh and lumbosacral region occurring just before or during menstruation, in the absence of any identifiable pathology.[2,3] Prevalence rates are as high as 90%. Initial presentation of primary dysmenorrhea typically occurs in adolescence. Commonly the incidence of primary dysmenorrhea is with age, anxiety and stress. [2] Causes that induce pain are psychosomatic factors, dysrhythmic movements of uterine contractions and hypoxia of the uterus. [3]

Methodology

This literature review was conducted to explore the currently available different treatment approaches for management of primary dysmenorrhea in Physiotherapy, Ayurved, Homeopathy, Modern Medicines, Unani, Yoga, Acupuncture, Acupressure, Dietetics. The review included research papers published from 2010 to 2020. The method of demonstration of data in this study, including the specifying of the data gathering, analysis and interpretation and findings are according to the systematic study reporting system i.e.PRISMA. Key words were: Primary dysmenorrhea, Physiotherapy, Ayurveda, Homeopathy, Pharmacology, Modern medicine, Yoga, Acupuncture, Acupressure, Dietetics.

The extraction and assessment of the quality of papers was performed according to the inclusion and exclusion criteria explained in Table 1. Keywords used for selection are given in table 2. The selection process is explained in Table 3. Details of 27 papers which were not considered for review are explained in Table 4.

Inclusion Criteria	Exclusion Criteria
Publication year 2010 to 2020	Prevalence studies
All types of management approaches	Papers with abstract in English but manuscript in other language
English Language	
Free Full text papers	

Table 1: Inclusion and Exclusion Criteria

Key words

1) Physiotherapy in primary dysmenorrhea
2) Ayurveda in primary dysmenorrhea
3) Homeopathy in primary dysmenorrhea
4) Modern medicine in primary dysmenorrhea
5) Unani in primary dysmenorrhea
6) Non Pharmacological management in primary dysmenorrhea
7) Acupressure in primary dysmenorrhea
8) Acupuncture in primary dysmenorrhea
9) Yoga in primary dysmenorrhea
10) Interdisciplinary management in primary dysmenorrhea

Table 2: Keywords used to access articles

Studies identified in databases (n=80)
↓
Studies excluded on the basis of relevance (n=04)
↓
Studies included for detailed analysis (n=76)
↓
Studies excluded on the basis of publication year criteria (n=27)
↓
Studies reaching inclusion criteria (n=50)

Table 3: The selection process of included paper

No. excluded articles	Reason for exclusion
7	Not related to primary dysmenorrhea
8	Prevalence based and not intervention based
5	Only abstract was in English language
10	Published before 2010

Table 4: Explanationabout exclusion criteria

Findings

Total 83 studies were found in databases such as Google, Researchgate, PubMed, Google scholar. Multiple keywords in combination were used individually and in the combination to access the articles (Table 2). 30 articles were excluded (Table 4). Selected 53 articles were assessed forthe information related to the selected papers, including publication period, size of the samples,treatment disciplines and their general characteristics, and reported conclusions of the study were extracted (Table 5)

Treatment approach	Articles accessed	Included articles	Conclusions
Physiotherapy	19	15	Application of heat, TENS, stretching, connective tissue massage is proved beneficial for pain reduction during menstrual cycle. Whereas some sports exercises, Pilates, strengthening or some patient specific exercises also help to improve primary dysmenorrhea.
Yoga	04	03	Yoga can be included as an effective technique for managing dysmenorrhea as it helps in reducing stress and improving body functions.
Ayurveda	11	04	Ayurveda is an effective treatment for management of dysmenorrhea *(kashtartava)*. The balance of 3 doshas is the primary goal for managing dysmenorrhea by implication of the medicines.
Homeopathy	05	04	Frequently used medicines like Caulophyllum, Cimicifuga etc. in primary dysmenorrhea with good results. Other individualised homoeopathic medicines (similimum) can also offer significant relief to the patients of primary dysmenorrhea.
Modern	09	03	Intervention with NSAIDs, high dose of Vit.

medicine			D, hormone therapy shows significant effect in management of dysmenorrhea.
Naturopathy	03	02	Naturopathy shows significant effect in managing primary dysmenorrhea. But more research and documentation is required.
Unani	10	07	Ginger, Dill seed, Cinnamon and other combinations of Unani medicines are beneficial for management of primary dysmenorrhea.
Acupressure and Acupuncture	15	12	Practitioners can consider using acupuncture and acupressure to treat primary dysmenorrhea, but a need exists for higher quality, randomized, blinded, sham-controlled trials with adequate sample sizes to establish clear effects of the approach.

Table 5 : Included disciplines of management approach

Results

Total 53 articles were included for assessment. Different disciplines approach management in different ways. Physiotherapy and Yoga approach PD by management of stress and lifestyle with specific exercises, strengthening and meditation, physiotherapy also manages the pain during the menstrual cycles by application of taping, TENS and heat etc. Ayurveda believes that PD is the result of imbamalnce of vatadosha.So maintaining the balance between kapha, pitta and vata is the primary goal by intervention with ayurvedic medi-

cines and panchakarma. Caulophyllum, Cimicifuga, Xanthoxylum, Viburnum opulus, Belladonna, Magnesia phosphorica, Colocynthis, Pulsatilla, Melilotus, Veratrumviride are the commonly used medicines in Homeopathy practice for managing PD. Modern medicine practices implementation of a high dose of Vit. D, hormone therapy. Use of contraceptive pills and NSAIDs for reduction of pain. Unani uses various combinations of spices as herbal medicines. Naturopathy intervention shows significant effects in PD but more research needs to be done and documented. Acupuncture and acupressure suggests that targeting SP6 meridian is beneficial for managing the PD. There are researches available in individual disciplines but there is a lot of scope for research in interdisciplinary approaches to manage Primary Dysmenorrhea in a better and holistic approach.

Discussion

The aim of study was to review different types of management approaches for management of primary dysmenorrhea. According to the definition menstruation is a physiological process which should not affect daily living activities[3]. It is observed that women are unaware that the pain during menstrual cycle affecting daily activities is not normal. Symptomatic management of dysmenorrhea can never be the solution. Finding the cause of pain managing stress and change in lifestyle promotes long term management. As discussed in the results many options are available to manage PD but it was observed that there is a lot of scope for research in interdisciplinary approach for managing Primary Dysenorrhea.

Conclusion

Multiple treatment approaches are available within different systems of medicine. A holistic treatment approach needs to be evolved using an interdisciplinary approach among the different health sciences, to allow for best possible care of women suffering from the primary Dysmenorrhea.

Conflict interest - None

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Epigenetic Modification as a Potential Treatment Strategy by Physical Activity in Patients with Cardiovascular Disorders(CVD)-A Systematic Review

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Abstract
Background:

Physical inactivity and imbalanced diets are the main causes of chronic diseases, which are the result of improper lifestyle choices. Frequent exercise has been shown to enhance health, and there is mounting evidence that these benefits could be due to epigenetic changes.

Objective:

To identify epigenetic modifications as outcomesof exercise interventions related to specific metabolic alterations.
Methods: The Preferred Reporting Items for SystematicReviews and Meta-Analyses Protocols (PRISMA-P).
review. Out of 2,473 articles identified, only 3 articles metthe inclusion criteria.

Results:

The review's sections were arranged based on metabolic changes, with studies categorized by trained, ill, and healthy persons. Human resistance training produced epigenetic modifications in insulin sensitivity and energy metabolism pathways, supporting the health of skeletal muscle. By altering DNA

methylation and the expression of particular miRNAs, endurance exercise also changed biomarkers linked to metabolic abnormalities. Nonetheless, to improve physiological adaptation, both resistance and endurance training are required, and a mix of the two appears to be required to effectively address the rising incidence of non-communicable diseases.

Conclusion:

A particular advice for the kind, level of intensity, or duration of exercise that may be advantageous for various subsets of the population (healthy, ill, and/or trained) cannot yet be made due to the complexity and variety of the material now in publication. This review does, however, emphasize the value of exercise for health and the need for further study in this new field to find epigenetic biomarkers that may be used as markers of exercise adaptations.

Introduction:

A complicated multifactorial condition, cardiovascular disease is brought on by the interplay of hereditary and environmental variables.

A positive family history for CVD has long been recognized as a significant risk factor in clinical and population-based research.1

Numerous structural and functional effects of CVD can result in mortality or irreversible heart damage.2

There is mounting evidence linking the onset and progression of cardiovascular disease to epigenetic processes such as DNA methylation, histone modification, and non-coding RNA.Due to their early onset and involvement in essential cardiovascular pathologically linked pathways, epigenetic markers are significant molecular indicators of cardiovascular disease. Most significantly, it can be utilized as biomarkers for cardiovascular disease in order to diagnose, forecast, and assess treatment response.3

In 2022, a study published in European Heart found that the epigenetic enzyme DOT1L orchestrates vascular smooth muscle cell-monocyte crosstalk and protects against atherosclerosis.4 In recent years, epigenetics has been gradually studied in other cardiovascular diseases. Bahado-singh et al. discovered 165 significantly differentially methylated CpG loci in tetralogy of Fallot cases.5

It is widely acknowledged that exercise helps the heart in both physiological and pathologic circumstances, and that physical inactivity is one of the main risk factors for heart disease. Nevertheless, little is known about the molecular processes underlying the cardioprotective benefits of exercise. Recently, a growing body of research suggests that epigenetic changes have a role in promoting heart health and preventing heart disease.

The positive effects of exercise and other lifestyle factors on human health and disease may be linked to the broad epigenetic changes they cause in numerous organs, including DNA/RNA methylation, histone post-translational modifications, and non-coding RNAs. It has been demonstrated that exercise can directly affect cardiac epigenetics to promote cardiac health and protect the heart from various pathological processes, or it can modify epigenetics in other tissues, lowering the risk of cardiac illness and providing cardioprotection via exerkines. A thorough understanding of the epigenetic landscape of the cardioprotective response to exercise will reveal new therapeutic targets for cardiovascular disorders.6

Exercise is therefore a potent instrument for changing the gene expression patterns in skeletal muscle through epigenetic changes. The most well-known method of exercise adaptation is DNA hypomethylation and histone hyperacetylation in important skeletal muscle genes that respond to exercise.7

The heritability of CVD cannot be adequately explained by variations in DNA sequence. Instead, a growing body of research indicates that lifestyle and environmental factors impact epigenetic systems, such as histone modification, DNA methylation, and non-coding RNA expression.8 By causing both temporary and permanent epigenetic modifications, exercise is a potent epigenetic modulator that activates signaling cascades linked to cardiovascular advantages. There are great studies of epigenetic treatments for established CVD. 9,10,11

There are different methods with which we can assess the epigenetic modification in patients with Cardiovascular disorders, bisulphite sequencing,12Recently, EM-Seq and TAPS have been developed to replace bisulphite sequencing.13RNA epitranscriptomic modifications sequencing14 and Third-generation sequencing.15

Need of the Study:

1. To study the effectiveness of epigenetics on cardio-vascular Disorder.
2. To study the effectiveness of exercise on epigenetics.
3. To introduce to new concept of testing epigenetics through third generation sequencing through DNA methylation analysis, DNA-protein interaction analysis and chromatin accessibility analysis broadly called as microarrays.
4. To formulate the relationship between epigenetics and Cardiovascular disorders.

Methodology:

The present review follows the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Protocols (PRISMA-P).16

Inclusion Criteria:

1. This evaluation included studies assessing epigenetic changes associated with metabolic changes in response to exercise training initiatives or individual exercise sessions, including obesity, insulin resistance, type 2 diabetes, inflammation, lipid changes, cardiovascularrisk, and atherosclerosis.

2. Included were longitudinal, cross-sectional, randomised controlled trials, and studies without randomisation carried out on adults (> 18 years old) and published in English.

Search Strategy and Study Selection:

The PubMedwas searched for articles related to epigenetics using the following terms: "Epigenetic and Exercise," "Epigenetic and Physical Activity," "Exercise and DNA methylation,""Exercise and epigenetic modification," and "Exercise and DNA methylation and Obesity," which were published between January 2010 and June 2023, yielding a total of 2,423articles.

First, we removed duplicates, and then, after determining eligibility criteria, we had a total of 126 articles.

After reading the research, we excluded those that did not fulfill the inclusion criterion, leaving 11 publications that met our requirements. As a result, the current analysis included 11 publications in total. The article titles,

abstracts, and keywords provided by the database were reviewed to establish their inclusion.

Cardiovascular Diseases and Epigenetics:

In the last ten years, epigenetics has ushered in a new era of genetic medicine that offers an alternative method of treating human illness. To catalog the human epigenome and link its relationship to pathophysiology, several multinational initiatives have already been started, such as the multinational Human Epigenome Consortium (IHEC) and the Human Epigenome Project (HEP).17

There are 3 mechanisms by which epigenetics affects the physiological processing without changing the sequence of **DNA,DNA methylation,18Histone modification,19Noncoding or MicroRNA**s.20

Exercise-Induced Epigenetic Modifications in Genes Related to Cardiovascular Diseases:

Exercise benefits the heart even at lower levels than those advised by the WHO; it lowers adult all-cause mortality and improves cardiometabolic biomarkers in adolescents.21

Numerous recent investigations have suggested that epigenetic changes play a role in exercise-induced cardioprotection.22

Numerous studies conducted in recent years have demonstrated the potential of aerobic and resistance training to either lower the incidence of cardiovascular and metabolic diseaseswith coronary heart disease.23

Physical activity in the prevention of human diseases: role of epigenetic modifications:

1. Denham J et al, Changes in the leukocyte methylome and its effect on cardiovascular related genes after exercise. J Appl Physiol. 2015;118:475–488.

Type of exercise:4 weeks of sprint interval training (3 per week, 249 min in total)
Tissue studied: Leukocytes

Epigenetic response: Training induces specific leukocyte DNA methylation across MIR21 and MIR210

2.RönnT,et al. A six months exercise intervention influences the genome-wide DNA methylation pattern in human adipose tissue. PLoS Genet. 2013;9:e1003572.

Type of exercise: 6 months aerobic exercise (3hrs per week: 1 session of 1h spinning; 2 sessions of 1h aerobic

Tissue studied: adipocyte

Epigenetic response: Significant correlation between PA and the methylation of markers associated with obesity and T2D

3.Nitert MD, et al. Impact of an exercise intervention on DNA methylation in skeletal muscle from first-degree relatives of patients with type 2 diabetes.

Type of exercise:6 months aerobic exercise (3hrs per week: 1 session of 1h spinning; 2 sessions of 1h aerobic

Tissue studied:Vastus lateralis

Epigenetic change: Significant correlation between PA and the methylation of markers associated with T2D.

Results:

Heterogeneity in the sample size, population characteristics, type, intensity, and duration of exercise interventions, as well as the many tissues employed for experimental analyses, are all evident in the research that are part of this review.

As a result, the results show that epigenetic changes are a result of exercise treatments linked to metabolic changes. Nevertheless, it is still difficult to integrate and understand all this information.

Conclusion:

The possibility that altering lifestyle factors, particularly raising PA levels, can affect the epigenetic patterns linked to human cancer, metabolic, cardiovascular, and neurological illnesses has been the subject of numerous studies.

Large-scale, cooperative efforts involving large, well-phenotype cohorts are necessary in light of the promising findings provided throughout this study.24

Furthermore, we must consider the fact that epigenetic patterns are known to vary amongst tissues, and in certain tissues, they can even vary cell-specifically. In fact, it is unknown exactly how physical activity affects the epigenetic changes of many human organs.

Given this, exercise continues to be a crucial component in fostering significant biological changes that have significant effects on public health.

Individuals for whom a customized fitness program could dramatically change the epigenomic profile and, consequently, the risk of illness onset or progression may be identified by future collaborative investigations that uncover epigenetic markers with translational importance.

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Effect of Square Stepping Exercises on Balance and Cognition at The End of 2 Weeks Versus 4 Weeks in Elderly

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Abstract

Balance is crucial for preventing falls and maintaining functional independence, while cognition, which includes attention and memory, plays a vital role in daily activities. As aging leads to declines in both physical and cognitive functions, interventions like SSE, which combine physical coordination and cognitive challenges, may help improve both domains.This study involved 57 elderly participants aged 65 and above, who were assessed using the Timed-Up and Go (TUG) and Four-Square Step Tests (FSST) for balance, and the Mini-Mental State Examination (MMSE) for cognition. Participants underwent a 4-week SSE program, with sessions three times a week, each lasting 30 minutes, including warm-up, intervention, and cool-down exercises.Results showed significant improvements in balance after both 2 and 4 weeks, as measured by TUG and FSST. However, cognitive improvement was only significant after 4 weeks, with MMSE scores showing a marked increase. These findings suggest that while a 2-week SSE intervention provides immediate benefits for balance, a 4-week program may offer more substantial improvements in both balance and cognition. SSE, as a low-impact and dual-task exercise, proves to be an effective and practical intervention to enhance functional mobility and cognitive health in older adults, making it a recommended strategy for fall prevention and cognitive preservation.

Keywords: Square stepping exercises, balance, cognition, elderly

Introduction

Balance is defined as the ability to maintain the body's centre of gravity over its base of support, ensuring postural stability during static and dynamic activities. It relies on the integration of sensory, motor, and cognitive systems to prevent falls and maintain functional independence.1Cognition encompasses mental processes like attention, memory, executive function, and problem-solving, all of which play a vital role in daily activities. The elderly, individuals aged 65 years and older, represent a population vulnerable to declines in both physical and cognitive functions, largely due to age-related physiological changes.2,3

Aging leads to deteriorations in neuromuscular systems, sensory processing, and motor control, contributing to balance impairments. Muscle strength and proprioceptive feedback decline, affecting stability and increasing fall risk.3Similarly, cognitive decline arises from structural and functional changes in the brain, including reductions in gray matter volume and synaptic plasticity. These changes impair memory, attention, and executive function, adversely impacting the elderly's independence and quality of life. Both balance and cognition are closely interlinked, as maintaining balance requires significant cognitive input, particularly in dual-task scenarios.2,3

Square stepping exercises (SSE) are structured, grid-based interventions that challenge participants to follow complex step patterns. They simultaneously engage physical coordination and cognitive functions such as memory and attention. SSE has been shown to improve balance by enhancing lower limb strength and coordination, while the cognitive component stimulates neural pathways, promoting better executive functioning. Recent studies highlight the dual-task benefits of SSE in reducing fall risk and improving cognitive flexibility in older adult.2,3The low-impact nature of SSE makes it a suitable intervention for a broad spectrum of elderly individuals.4

Although SSE is proven effective, the optimal duration for significant improvements remains unclear. A 2-week program may provide quick, feasible results, benefiting those with limited time or access to rehabilitation programs. In contrast, a 4-week intervention could lead to more sustained and robust improvements in both balance and cognition. Comparing these durations is essential to establish the minimum effective dose, enabling healthcare providers

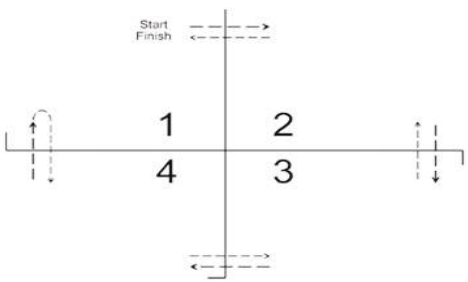
to design cost-effective and tailored interventions for the elderly population.1,4

Methodology

This study was a pre and post experimental study in which 57 elderly males and females above the age 65 and not having any musculoskeletal, neurological and cardiovascular impairments were included. Participants who were willing to participate in the study were assessed for their balance using the Timed-up and go and four-square step test (FSST).

In TUG, the patient should sit on a standard armchair, placing his/her back against the chair and resting his/her arms chair's arms any assistive device used for walking should be nearby. Regular footwear and customary walking aids should be used. The patient should walk to a line that is 3 meters (9.8 feet) away, turn around at the line, walk back to the chair, and sit down. The test ends when the patient's buttocks touch the seat. Patient should be instructed to use a comfortable and safe walking speed. A stopwatch should be used to time the test (in seconds).1

In FSST, the patient is instructed to stand in square 1 facing square number 2. The patient is required to step as fast as possible into each square in the following sequence: 2, 3, 4, 1, 4, 3, 2, and 1 as shown in figure 1.This requires the patient to step forward, backward, and sideway to the right and left.1



They were asked questions according to the Mini Mental State Examination (MMSE) for their cognition assessment. The MMSE scale used to assess cognition is divided into seven categories each representing specific cognitive functions like executive functions, memory, language, attention, immediate and delayed recall. Scores range from 0 to 30. Lower scores indicate cognitive impairments.1

They then underwent the intervention of the square stepping exercise: elementary patterns 1 and 2, [16] over a period of four weeks, three sessions weekly, for duration of 30 minutes per session. The 30 minutes of session was divided as 5 minutes of warm up, 20 minutes of intervention followed by 5 minutes of cool down. Warm up and cool down exercises included deep breathing exercises and few upper and lower extremity range of motion exercises. After two- and four-week's duration their balance and cognition were again assessed.

Results

Number of participants divided into young old, middle old and old old elderly classification5

Age	Young Old (65 To 75 Years)	Middle Old (75 To 85 Years)	Old Old (>85years)
Number Of Participants	34	8	15

Comparison of Balance on TUG (seconds): Pre and post 2 weeks and 4 weeks intervention

Intervention	Pre (Mean± SD)	Post (Mean± SD)	p value
2-week intervention	22.72±6.04	19.12±5.27	$p < 0.0001$
4-week intervention	22.72±6.04	16.2±4.71	$p < 0.0001$

Comparison of Balance on FSST (seconds): Pre and post 2 weeks and 4 weeks intervention

Intervention	Pre (Mean± SD)	Post (Mean± SD)	p value
2-week intervention	13.68±3.08	11.56±2.71	$p < 0.0001$
4-week intervention	13.68±3.08	10.2±2.36	$p < 0.0001$

Comparison of Cognition on MMSE: Pre and post 2 weeks and 4 weeks intervention

Intervention	Pre (Mean± SD)	Post (Mean± SD)	p value
2-week intervention	25.68±1.82	26.2±1.19	p =0.07
4-week intervention	25.68±1.82	29.84±0.37	p < 0.0001

Discussion

This study showed the effectiveness of the Square Stepping Exercise on balance, risk of fall and cognitive function in elderly males and females. The elderly showed significant improvement in balance post 2 weeks and 4 weeks and in cognition only at the end of 4 weeks.

Walking is a popular and widely practiced form of exercise that aids in improving functional fitness and is often used to prevent falls. Similarly, Step and Step Exercise (SSE) shares movements akin to walking but incorporates multidirectional steps, including forward, backward, lateral, and oblique directions. These varied movements enhance the activation of both synergist and agonist leg muscles, as discussed by Orr and colleagues, who highlighted that consistent muscle activation during the concentric phase strengthens leg muscles, thereby improving balance.6

Jessica et al. emphasized that activating the synergists and agonists involved in locomotion improves functional mobility components, which, in turn, enhances overall mobility. They also identified SSE as a low-intensity exercise that specifically targets functional mobility, making it a suitable option for older adults, particularly those with fragile health.7

Research indicates that postmenopausal women often experience reduced postural stability due to hormonal imbalances, which may cause dizziness and indirectly affect balance. Physical exercises, however, can help stabilize hormone levels, alleviate menopausal stress, and subsequently improve balance and reduce postural instability.8

Gunendi et al. investigated the impact of a four-week submaximal aerobic exercise program on balance in postmenopausal women with osteoporosis. Their findings showed that such a regimen significantly improved balance.8 Similarly, this study employed a four-week SSE intervention, which, like aerobic exercises, included warm-ups, a 20-minute main session, and a cool-down phase.

Ryosuke Shigematsu et al. reported that SSE enhances functional fitness in the lower extremities, addressing a critical risk factor for falls caused by balance loss. By focusing on functional mobility, SSE effectively mitigates postural instability, thereby lowering the risk of falls.9

Furthermore, studies demonstrate that SSE promotes balance improvement and fall prevention by stimulating the sensorimotor system. Long-term practice of these exercises enhances motor and cortical function, positively impacting the vestibular system and directional control, which are crucial for maintaining balance and mobility in elderly populations.10

Van Schoor NM et al. and Hauer K et al. highlighted the cognitive processes involved in maintaining balance and preventing falls. Their studies emphasized that executive functions serve as independent predictors of balance, walking speed, and fall risks.10,11Research by Coppin AK et al. and Sheridan PL et al. further suggested that dual-task activities rely heavily on executive function and processing speed, while Silsupadol et al. found that targeting these cognitive abilities could improve dual-task performance.12, 13,14

SSE inherently incorporates dual-task activities, such as identifying the correct sequence of numbers, judging the size of boxes, and performing precise foot placements. These simultaneous actions challenge executive functions, thereby enhancing balance and cognitive abilities in elderly individuals.

Tiffany et al. found that participating in multicomponent exercise programs that include aerobic training and balance-focused activities positively impacts cognitive functions. The intervention protocol in this study emphasized balance training combined with 30 minutes of exercise, including warm-up and cool-down phases, which contributed to the participants' aerobic conditioning and cognitive improvement.15

According to Ryosuke Shigematsu et al., SSE involves short reaction times, an essential cognitive function. They suggested that the diverse stepping

patterns and levels of muscle coordination in SSE surpass the benefits of merely forward-stepping or walking in improving information processing and psychomotor abilities.9

Finally, a Brazilian study by Teixeira et al. (2013) concluded that SSE enhances cognition and executive functioning. SSE stands out as a simple, practical, and widely acceptable exercise that not only improves balance and cognitive function in older adults but also reduces the risk of falls. This makes it a highly recommended intervention for elderly individuals, particularly those experiencing balance and cognitive impairments.16

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The Effect of Tens And Exercises On Pain Relief In Primary Dysmenorrhea
A Comparative Study

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INTRODUCTION:

Dysmenorrhea is defined as painful menstruation that prevent a women from performing normal activities. Approximate 20-90% of women suffering from this problems during their reproductive age. (1) Causes:The main cause of dysmenorrhea is unknown however excessive production and release of prostaglandin during menstruation by the endometrium cause hyper-contractility of the uterus leading to uterine hypoxia and ischemia. The condition may be primary or secondary .Primary dysmenorrhea is a major cause for disability in most of the adolescent girls which lead to inability to concentrate on their work or studies ,inability to perform in their academic activities like physical training or sports ,thus it has a large impact on daily life activities . The pain is felt over the lower abdomen and sacral region in the first hour of periods and it may be colicky. It often occur in teenager and women in their 20s clinical feature of primary dysmenorrhea are Back pain also it may radiated to the back of the legs ,Nausea ,Vomiting ,Diarrhea ,Fatigue, Fever, Headache. Physical exercise has been suggested as a non-medical approach to reduce painful symptoms of dysmenorrhea. The result of various studies have shown that with sports activity, the intensity of symptoms and pain has decrease.5.in some published article .no correlation was found between physical activity level and dysmenorrheal.6 moreover, after checking with depression and mood swings, they found that sports in some women induce higher levels of symptoms along with menstruations. Recent studies showed that high frequency TENS was useful to reduce painful symptoms of dysmenorrhea. Howeverthere was insufficient evi-

dence to determine the effectiveness of low-frequency TENS. It also found from one methodological study that there appear to be a benefit from the patient occupation in reducing dysmenorrhea (Helms 1987). Thus from the literature studied it appears that both exercises and tens are useful in relieving the symptoms of dysmenorrhea but it is not clear which treatment protocol is more effective in relieving the symptoms of dysmenorrhea . Hence it was decided to compare the effectiveness of exercises and tens in patients with dysmenorrhea.

NEED FOR STUDY: Dysmenorrhoea is a painful condition. It often leads to restriction of a normal activities. Physical therapy plays important role in relieving symptoms. Various physiotherapy techniques are found to be useful in dysmenorrhoea. Effectiveness of different PT techniques is uncertain. Hence study has been undertaken.

A**IM:** To determine and compare the effectiveness of TENS and Active exercise on pain relief in Primary Dysmenorrhea.

OBJECTIVE: 1) To study the effectiveness of high tens on pain relief in primary dysmenorrhea. 2) To study the effectiveness of low tens on pain relief in primary dysmenorrhea .3) To study effectiveness of active exercises on pain relief in primary dysmenorrhea.To compare the effectiveness of high TENS and low TENS and active exercises on pain relief in primary dysmenorrhea.

HYPOTHESIS: NULL HYPOTHESIS: There is no effect of high TENS, low TENS and Active exercises on pain relief in primary dysmenorrhea. ALTERNATE HYPOTHESIS: There is effect of High TENS, low TENS and Active exercise in primary dysmenorrhea and one of these two is more effective.

The inclusion criteria for the study were:Women with age group 17-28 years,Women with Primary dysmenorrhea, Women with moderate pain INTENSITY ON NRS,The female who is able to perform exercises by themselves 23independently. Exclusion criteria for the study were: Female who are not willingly to participate, Secondary dysmenorrhea,Women suffering from condition in which TENS is contraindicated,Patient taking antispasmodic for pain relief.

METHODOLOGY: The study was comparative study done in Tilak Maharashtra Vidyapeeth, Pune. 30 patients diagnosed with primary dysmenor-

rhea were included.

MATERIALS: Pen, Paper, Consent form, Transcutaneous Electrical NerveStimulation (TENS),Numerical pain rating scale(NPRS), Moos menstrual distress questionnaire (MMDQ).

PROCEDURE: Ethical clearance was obtained from the institution.The subject were included as per the inclusions and exclusions criteria and the informed consent was taken from them.A total 30 diagnosed subject with history of menstrual pain were included in the study and randomly divided in the two groups by a simple random sampling method moos menstrual distress questionnaire was explained to the subject.questionaire were filled pre n post intervention.Pre n post pain intensity was noted on NPRS scale. Group A was given active exercise and conventional tens during 1-2 days of their menstrual pain periods for 15minutes in supine lying frequency (80-`120hz),narrow pulse width (40-75us)and an intensity that produce a comfortable perceptible paraesthesia without muscle contraction .Machine used was 4 channels TENS. Group B were given active exercises and Acupuncture TENS duringtheir first 2 days of menstrual periods for 15 minutes with frequency (1-4 Hz) wide pulse width (100-250us) and intensity to tolerance level to produce visible rhythmic muscle contractions. All the data was analysed and interpreted using application of SoftwareInStat 3. The result was considered to be significant if the p value was < 0.05 with 95% confidence interval. 30 subjects were taken for study. Paired t test was used to compare between the pre and post values of MMDQ n NPRS for groupA and group B.

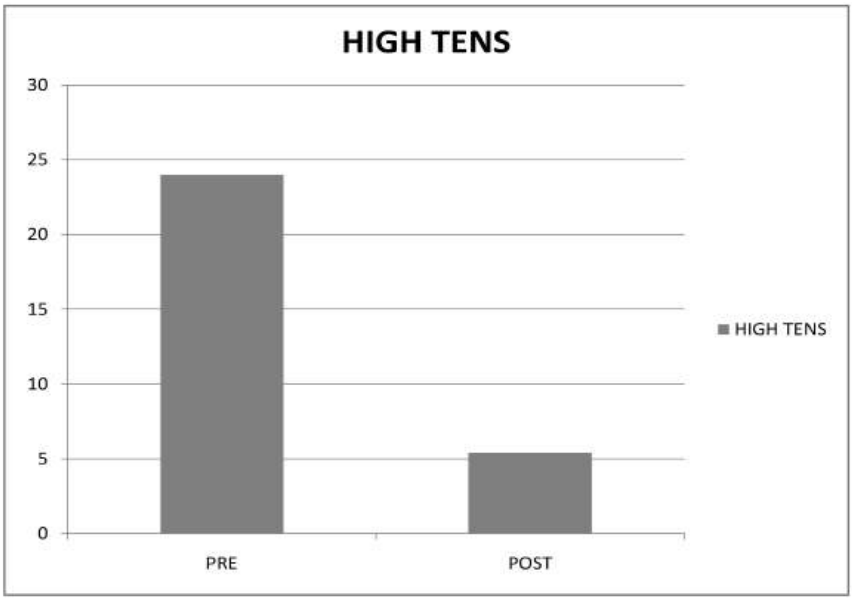
Results:

TABLE 1:Pre and Post score of MMDQforhigh tens

HIGH TENS	Mean+S.D	T value	p value
Pre	24+_6.245	12.083	<0.0001
Post	5.4+3.680		

*Significant if $p < 0.0001$

Graph 1.1: Pre and Post scoreMMDQ for High Tens



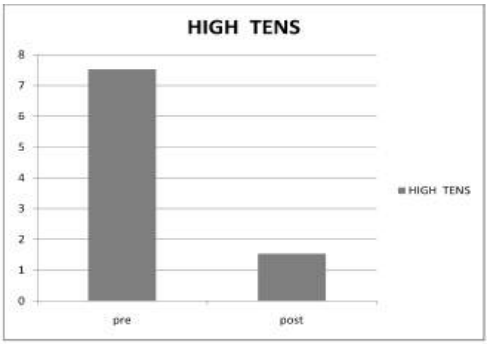
MOOSMENTRUAL DISTRESS QUESTIONAIRE: There is significant decrease in MMDQ score post intervention

TABLE 2:Pre and Post value of NPR for High Tens

HIGH TENS	Mean±S.D	T value	p value
Pre	7.533±0.9155	19.442	<0.0001
Post	1.533±0.9155		

*Significant if $p < 0.0001$.

Graph 1.2 Pre and Post value of NPRS for high tens

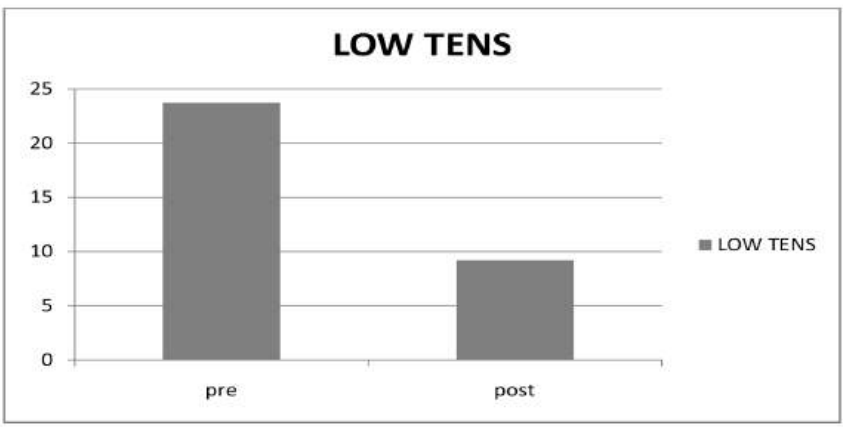


There is significant decrease in NPRS value post intervention.

TABLE 3: Pre and Post scoreof MMDQfor low frequency TENS

Low TENS	Mean±S.D	T value	p value
PRE	23.733±2.939	14.977	<0.0002
POST	9.2±3.468		

*Significant if $p < 0.0001$.



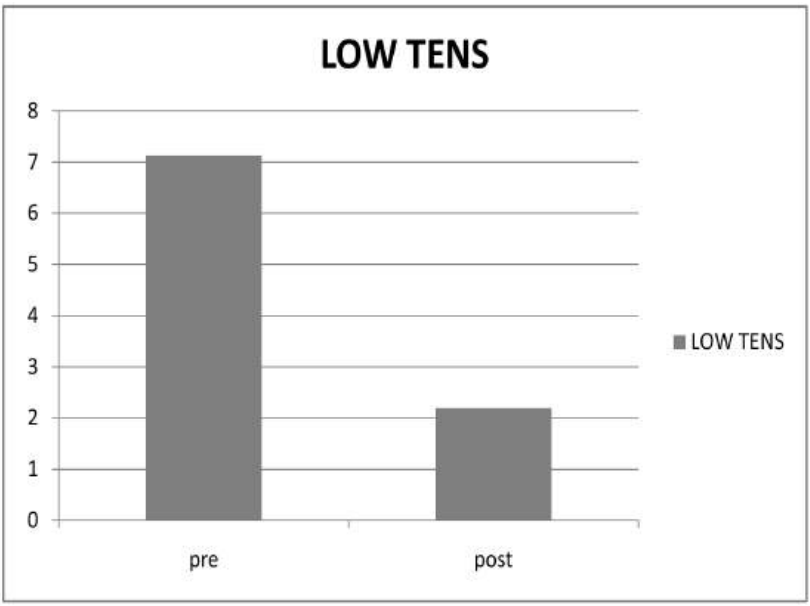
There is significant decrease in MMDQ value post intervention

TABLE 4: pre and post valueof NPRSfor low frequency TENS

Low frq TENS	Mean±S.D	T value	p value
PRE	7.133±2.939	14.322	<0.0002
POST	9.2±3.468		

*Significant if $p < 0.0001$.

Graph1.4:Pre and Post value of NPRS for low frequency tens



There is significant decrease in NPRS value post intervention

Table 5: Showing mean difference in scale in group A and group B

	Group A	Group B	t value	P value	SIGNIFICANCE
MMDQ	18.6	14.533	0.3342	0.77	NOT
NPRS	6	4.733			SIGNIFICANT

GRAPH 1.5: Mean difference in scale in group A and group B

Graphshows:Mean difference of the 2 outcome measure scales was calculated and graph was plotted which shows higher difference in Group A samples than in Group B. However, unpaired t test was done to calculate p value that was 0.77 concluding that there is no significant difference in the values.

DISCUSSION:

The aim of the study was to compare the effectiveness of high tens ,low tens and active exercise on pain relief in subjects having primary dysmenor-

rhea. In our study, 30 subject were included and their data was collected. The subject were divided in two groups. Group A (high tens) and group B(low tens). The result shows that there was statistically significant difference in both group when the pre and post MMDQ n NPRS score were compared. The result showed a statistically significant difference between group A and group B when the post treatment MMDQ score n NPRS were compared. High frequency Tens was found to be more effective than low Tens after the comparison was done.Our hypothesis has been accepted, that when HIGH TENS, LOW TENS and active exercises were given to the dysmenorrhea subject in group A and Group B, it was found to be decrease in MMDQ score with mean=5.4+3.680 in group A and a mean 9.2+3.468 in group B also decrease NPRS value with mean=1.533+0.9155 in group A and a mean 2.4+0.9856.both the treatment were found to be more effective inrelieving pain of dysmenorrhea.The reason that high frequency tens n exercise proved to be more effective in pain relieving primary dysmenorrhea are as follows:High frequency tens activate large myelinated A alpha and beta fibre and block the pain signal at spinal cord level which induce the pain relief . Where low tens activate smaller diameter afferent nociceptive fiber .Stress is supposed to increase the sympathetic activity which may lead to the increase of menstrual pain by enhancing the intensity of uterine contraction., so due to the fact that exercise could reduce and moderate stress, the sympathetic activity may be reduce as well.

The two group were compared by using paired t-test and unpaired test. intra group are compared using unpaired t-test. Comparison between group A paired t-test for high tens MMDQ showed i.e. 12.083 with 14 degrees of freedom and n is extremely significant and NPRS value show i.e show 19.442 with 14 degree of freedom and is extremely significant.Comparisons between group B paired t-test for low tens MMDQ showed i.e14.977 with 14 degree of freedom and is extremely significant and NPRS value show i.e. shows 14.323 with 14 degree of freedom and is extremely significant. Comparison between two groups of MMDQ showed unpaired t value i.e. 2.910 with 28 degree freedom and is extremely significant and NPRS showed unpaired t value i.e. 0.0188 with degree of freedom and is extremely significant.

CONCLUSION:

We observed high frequency tens and active exercises were more effective as compared to low frequency tens and active exercise on pain relief in subjects with primary dysmenorrhea.High frequency tens activate large myelinated A alpha and beta fibre and block the pain signal at spinal cord level

which induce the pain relief . Where low tens activate smaller diameter afferent nociceptive fiber. Stress is supposed to increase the sympathetic activity which may lead to the increase of menstrual pain by enhancing the intensity of uterine contraction, so due to the fact that exercise could reduce and moderate stress, the sympathetic activity may be reduce as well.

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"Effect of Group Based Exercise on Balance, Risk of Fall and Depression in Elderly."

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Abstract

Background and objectives:

Fall in elderly are a major concern in terms of morbidity and mortality. Frequent falls and disability can lead to depression in the elderly. The objective of study was to find the effect of group-based exercise on balance, risk of fall and depression in elderly.

Materials and Methods:

This was anexperimental study conducted in old age home. In this study30participants who were over age of 65 years were selected. MMSE score above 24 were included in the study.Pre and post intervention measures included Berg Balance Scale (BBS) and geriatric depression scale (GDS).The training was performed in 45-minutes group sessions, with 15 participants in each group, three times per week for 4 weeks.

Statistical Analysis Used:

Wilcoxon Singe Rank test was used for comparing values of BBS and GDS pre and post intervention.

Results:

The data was analyzed and showed marked improvement in balance in elderly with statistically significant in Berg balance scale ($p < 0.001$). It alsoshowed that there was improvement in patient with depression. The results showed statically significant in geriatric depression scale ($p < 0.0001$). Conclusion:The study concluded that the 4-week group-based balance training program is effective in improving balance, risk of fall and depression in elderly.

Keywords: elderly, fall, depression, group exercise, balance training, berg balance scale, geriatric depression scale.

Introduction

Falls represent the most common mechanism of injury, and the main cause of death from injury, in people older than age 65 years. Approximately 30% of community-living older adults in developed countries fall per year, with 10% to 20% falling more than once.The incidence of falls increases with age and frailty level. Falls can be dangerous and can have potentially devastating physical, mental and social consequences.

Falls in the elderly are generally multifactorial and causes of falling are often categorized into intrinsic (personal) and extrinsic (environmental) factors. Some examples of intrinsic factors include poor balance, weakness, foot problems, visual impairment and cognitive impairment. Examples of extrinsic factors include ill-fitting footwear, poor lighting, slippery surfaces, and inappropriate furniture.Falls frequently lead to physical injury (e.g., fractures), reduced activity, loss of confidence and altered lifestyle in elder individual.Depending on the injury, falls can lead to disability and functional limitations that significantly increase the depression in older people.Depression accounts for the greatest burden among elderly. It decreases an individual's quality of life and increases dependence on others.

Research shows that balance impairment is a major contributor to falling in elderly individuals. Postural control is composed of three components Sensory input, Central processing and Effector output which provides information about the body’s position and postural response. Age related or pathological change in any of the components of postural control will increase the risk of fall in elderly.

Balance training exercises are very important to improve balance control and reduce the risk of fall. The balance must to be trained under single and multi-task conditions to perform many concurrent activities of daily living.These training programs are likely to be effectual because they target individual physiological system require in balance control, especially in the vestibular, visual, somatosensory and musculoskeletal systems.9

Combining balance training with specific cognitive training has appositive additional effect on dual functioning of postural control and divides attention. It also improves executive functions and reduces falls. Both balance control and other cognitive processing share cognitive resources and so simultaneous performance of a secondary task results in stability in both healthy and balance-impaired older adults. Factors like type and complexity of secondary task are responsible for variation in the level of performance. In older individuals'-gait,balance and risk of fall is hampered by secondary task. Dual task modifies our day to day physical performance.That is why, we believe that dual task and multi task exercises are important part of balance training program.11

Studies shows that group-based exercise has been shown to be more effective in decreasing fall frequency, increase balance, and improve quality of life. Community-based exercise programs provides a safe, supportive and interactive environment to build and maintain relationship, mental well-being and self-confidence. It is linked with the social aspect of community exercise is an improvement in participant satisfaction and motivation. The group-based exercise therapy improves and utilises social skills, reduces stress, boost motivation or provide accountability, improves self-confidence and reduces feeling of loneliness. Due to all these things, the attendance rate of older individual in the program also increases.

Since this treatment protocol is progressive in nature and also allows to be conducted at various levels such as basic, moderate and advance. This results in increasingly demanding for everyone. This progression followsbasic concept of exercise physiology, which explain how each individual can improve functional skill by performing training task of increasing difficulty and the intensityof exercise needs to be increased as the body adapt to exercise over the time.11 Many studies have been done on balance training but not done in the Indian population hence, we aim to incorporate balance training into group exercises so that they can have an effect on balance control. We also believe that this program can improve quality of life and help to reduce depression in

elderly.

Material and Methodology

Participants: 30

Inclusion criteria:

Age 65 and above
Both genders
Person who are willing to participate in the study
MMSE Score (Above 24)
Ability to walk without support (BBS score ≤ 45)
Ability to understand and follow commands

Exclusion criteria-

Individual associated with symptomatic cardiovascular, musculoskeletal or neurological condition causing imbalance
Any recent surgical procedure for lower limb or any injury
Visual and cognitive impairment
Auditory impairment.

Outcome Measures

1. Berg balance scale (BBS) (r =0.97)
2. Geriatric depression scale (GDS) (r = 0.89)

Objectives:

To Study the effect of group exercise on Balance & Risk of Fall by using "Berg Balance Scale (BBS)".

To Study the effect of group exercise on Depression in elderly by using "Geriatrics depression scale (GDS)"

Procedure

Permission was taken from institutional ethical committee. Various old age homes were approached and permission was taken for the study. There were 15 participants in each group.
Those with a MMSE score above 24 were included in the study. All the outcomes were measured pre- and post-intervention.

Intervention protocol was given three times a week for 4 weeks.
The session was conducted for 45-minutes.
Each session began with warm-up exercise (3-5 min)
Balance training program (30min)
The session ends with cool-down exercise (3-5min)

Sitting	Standing	Walking
Sitting in circle and passing a ball	Tandem stance	Walking forward and returning walking backwards
Sitting in a circle, kicking a ball	Standing on one leg	Tandem walking
Sit to stand	Standing in a circle, passing a ball	Stepping up and down
	Standing in circle, throwing a ball	Obstacle walking

Balance training protocol 11:
Basic Exercises (for 1-2 weeks)

Sitting	Standing	Walking
Sitting, adding a motor or cognitive task	Standing in a circle, passing a ball, doing a lunge when passing ball	Obstacle walking, adding motor or cognitive task
Sitting in a circle, kicking a ball, feet or arms in different positions	Standing in a circle, throwing a ball, doing a lunge when throwing	Walking, stepping on obstacle, placed in a row wide apart
Sit to stand with holding a ball	Standing with different bases of support , adding motor or cognitive task	Walking around, doing lunges on request (with left foot when tapped on left shoulder)
		Walking forward at a fast speed and returning walking backwards, adding motor or cognitive task
		stepping up and down, motor or cognitive task
		Tandem walking, adding motor or cognitive task

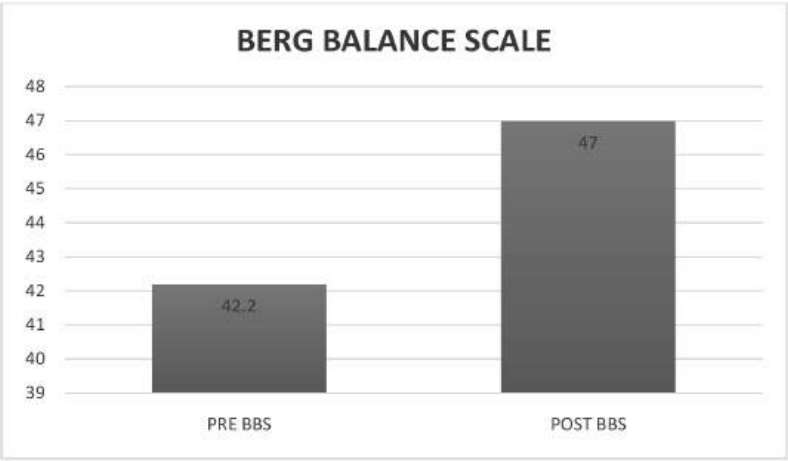
Advanced Exercises (for 4th week):-

Sitting	Standing	Walking
Sitting, adding both a motor and cognitive task	Adding a cognitive task to the exercises in moderate level	Obstacle walking, adding both motor and cognitive task
	Standing with different bases of support , adding both motor and cognitive tasks	Walking forward at a fast speed and returning walking backwards, adding both motor and cognitive task
		Tandem walking, adding both motor and cognitive task

Moderate Exercises (for 3rd week) :
STATISTICAL ANALYSIS

SPSS version 21.00 used for statistical analysis.
Average value for various parameters were calculated.
Shapiro wilk test was applied to test the data for normality.
As present data could not pass normality test hence Wilcoxon Signe Rank test wasapplied. Comparison of values of BBS and GDS pre and post intervention was done.

BBS SCORE	MEAN	P-VALUE
PRE	42.2	<0.000 1
POST	47.0	



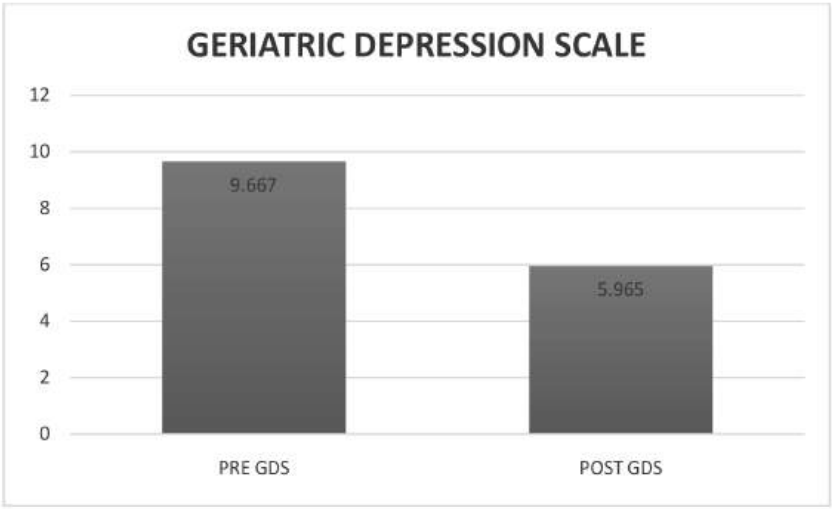
Result:
Berg balance scale score

Interpretation-

The graph represents berg balance scale score of participants. The graph shows that pre intervention the mean value was (42.2) and post intervention the mean

Geriatric depression scale score

GDS SCORE	MEAN	P-VALUE
PRE	9.667	<0.0001
POST	5.965	



value was (47.06) with significant p value 0.0001.

Interpretation-

The graph represents geriatric depression scale score of participants. The graph shows that pre intervention the mean value was (9.667) and post intervention the mean value was (5.965) with significant p value 0.0001.

DISCUSSION

According to WHO, aging is a progressive, generalized impairment of function which causes gradual decline in physical and mental capacity, increase risk of disease and ultimately death. Falls are very common in elderly people accounting for substantial mortality and morbidity. More than 30% of people who are 65 years of age or older fall each year, and in half of such cases, falls

are recurrent. These falls have immediate serious as well as long term complications. Although most falls involve multiple factors, causes of falling are often classified into intrinsic (personal) and extrinsic (environmental) factors. Falls in turn diminish function by causing physical injury (e.g., Fractures), activity limitation, fear of falling and loss of mobility. Balance impairment is a major contributor to falls in adults over 65 years of age and a growing body of evidence has confirmed the importance of cognitive factors to impaired balance among older adults.

Our study was planned to find Effect of Group exercise on Balance, Risk of Fall and Depression in Elderly. In this study 30 participants participated and people over the age of 65 years were selected. All the participants were older adults who volunteered for group-based balance training.None of participants reported history of neurological, musculoskeletal or cardiovascular diagnoses that accounted for possible imbalance. All the participants were able to walk without assistance. The mentioned scores of mini mental state examinationwere greater than 24 and hence were included in the study. We included Balance exercises in three positions i.e. sitting, standing and walking. Also these exercises were of increasing difficulty and complexity at three different level of progression (basic, moderate and advance). In 1-2 weeks, we gave basic exercises (e.g., Sit to stand, tandem stance), in 3rd we gave moderate exercises (e.g., Sit to stand with holding a ball, standing with different bases of support) and progressed to advanced exercises with adding motor and cognitive tasks in 4th week. As in the pre-evaluation the mean value of BBS was 42.2 and GDS was 9.667. After these exercises there was improvement found in BBS and GDS. The post-evaluation mean value of BBS was 47.7 and GDS was 5.965, which showed independent walking and mild depression.

Imbalance can result from impairment in sensory, motor and central processing system. When a component of a sensory, motor and central processing system is inadequate, it becomes more dependent on the remaining components and an increased challenge for balance control.Falls also damages mental and social consequences. Lack of physical activity can lead to mental health problems such as depression in elderly. Depression decreases an individual's quality of life and increases dependence on others. This leads to severe disability and adversely affects physical health.

In the present study, amongst 30 participant 73% were female and 27% were male. The maximum participants i.e., 43% belonged to 71-75, 40% belonged to 65-70 age group and 17% belonged to 76-80 age group. 60% par-

ticipants had BMI between 25.0-29.9, which was overweight. Also 23% participants had BMI between 18.5-24.9, which was normal and 17% participants had BMI between 17.0-18.4, which was underweight.

Studies has showed that the females are more prone to risk of fall than males. Women's bone mass declines faster than men. Due to their higher rates of osteoporosis women are known to be at higher risk for fall. Women with high physical dependency have a higher risk of falling. As an outcome, 34% of older women who are physically dependent also become house-bound, socially isolated, and at increased risk of falling. Also, high BMI has a negative effect on fall efficacy. Obesity is believed to reduce activity in the elderly and also increase imbalance.An increase in BMI is related not only to the level of physical activity but also related to the functional impairments, which could possibly lead to impaired balance and an increase risk of falls. Obesity can also lead to social and economic burdens such as a high risk of depression and a decrease in the quality of physical life associated with health.

In this study, the outcome measures used are Berg balance scale (BBS) and Geriatric depression scale (GDS) for depression in elderly. The berg balance scale (BBS) is a 14- item functional test that contains some common action (Sit to stand, stand without support, standing on one leg and picking up an object)required for performing day to day activities. Subjects were assessed on a 5-point (0-4) ordinal scale based on their ability to complete the given action. A score of 0 was recorded when the task could not be completed, and a score 4 indicated independence. A short form of GDS consisting of 15 questions was used. Out of 15 items 10 signified the presence of depression if answer was positive, while the rest signified depression when answered in negative way. Depending on age, education and complaint, 0-4 score are considered normal, 5-8 indicate mild depression, 9-11 indicate moderate depression and 12-15 indicate severe depression. (19,20,7)

The pre and post evaluation of balance control in elderly was determined by using berg balance scale. It shows that there is increase in balance control i.e., pre value (42.2) when compared with post intervention assessment (47.06), which shows marked improvement in balance in elderly. The results showed statically significant pre-post changes in berg balance scale ($p < 0.0001$) andthe preand post evaluation of participant with depression was determined by using geriatric depression scale (GDS). It showed that the pre value (9.667) when compared with post intervention value (5.965), which shows that there is improvement in patient with depression. The results showed statically signifi-

cant pre-post changes in geriatric depression scale ($p < 0.0001$).

In our study the balance training was given three times a week for 4 weeks and we found statistically significant improvement in balance and depression outcome as a result of a 4-week group-based balance training class. Regular exercise has been shown to have profoundly positive effect on depression in elderly. This helped to deviate from the cycles of negative thoughts associated with depression. Community-based physical activity encouraged the elderly to stay healthy and active. Exercising in a group boosted mental well-being and confidence and helped to provide a safe supportive and interactive environment for maintaining relationship. Thus, group exercises prove to be effective in reducing perception of depression as well as improve balance in elderly.

CONCLUSION

The study concludes that Mitchell's physiological relaxation technique is effective inreducing fatigue and improving quality of life in post covid patients. It can be used clinically to reduce symptoms and improves quality of life.

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Awareness Of Ante Natal Care And Exercises In Indian Females In The Age Group 18-30 Years

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Introduction:

India is a developing nation. The present strategy for the progress of the nation lies in its future generation; "healthier the generation, steeper will be the graph of development". Janani Suraksha Yojana launched by the Indian government in 2005 aims to improve the health of this generation. A healthy mother brings forth a healthy baby (K.PARK, 2015)1. The first step is toward better health for childbearing women, a life-saving step toward safe motherhood, a life-giving step toward sustained human development.1

Complication during pregnancy and childbirth are the leading cause of death and disability among reproductive age group females in developing countries. Maternal death is the death of a woman while pregnant or within 42 days of pregnancy due to cause related or aggravated due to pregnancy and not accidental or incidental death1. The Maternal mortality ratio represents the risk associated with each pregnancy. It is a millennium development goals indicator.1 Maternal mortality ratio is the number of maternal deaths during pregnancy per number of pregnant women x 1000. (K.PARK, 2015). The maternal mortality rate is 36 deaths per 1,000 pregnancies according to NFHS 2015-16. (NATIONAL FAMILY HEALTH SURVEY 2015-16, 2017)1.

The infant mortality rate declined from 79 deaths per 1,000 live births to 41 deaths per 1,000 live births during the five years before the 2015-16 survey.5 Infant mortality rate (IMR) is the number of deathsper 1,000 live births of children under one year of age.1 Globally the IMR has come down to 4.1 million in 2017 as compared to 8.8 million in 1999. But still it is higher in South Asian and African countries.IMR also is a MDG indicator. Premature birth is the biggest contributor to the IMR. Other leading causes of infant mortality are birth asphyxia, pneumonia, congenital malformations, term birth com-

plications such as abnormal presentation of the foetus umbilical cord prolapse, or prolonged labour, neonatalinfection, diarrhea, malaria, measles and malnutrition. One of the most common preventable causes of infant mortality is smoking during pregnancy.2 Awareness, commitment and leadership are needed to ensure that child health receives the attention and resources needed to accelerate progress towards MDG4 .The countdown 2015 initiative launched by WHO to reduce MMR and IMR provides data which concludes that ANC is one of the important step to decrease the mortality rate6

Ante natal care forms an important part of the mother and child health. It is an unavoidable step in reducing the maternal mortality ratio and infant mortality rate. Making the mother aware about her condition, informing her about the foetus's development, keeping her free of infections and addictions, providing proper nutrition, identifying the high risks (if any), preparing her physically and psychologically for the change, encouraging her for institutional deliveries are all a part of antenatal care routine. (NFHS)

It is seen that most pregnant Indian women are not aware about what is to be done during pregnancy which will result in a healthy baby. They are not familiar to the various investigations to be done, planning doctor's visits, taking timely immunization doses, nutrition intake, ante natal physiotherapy activities and exercise to be performed. Pregnant women who do not have adequate and appropriate information about pregnancy and childbirth would be indecisive to make choices that will contribute to their own well-being6 (anya, 2008) Informing females at a young age is a preventive step.

NEED FOR STUDY:

Ante natal care and classes form an important part of pregnancy. It is during the ante natal period that the mother as well as the father learn important aspects about pregnancy, child care, safe motherhood and parenting skills. Internationally lots of education classes are conducted to inform the expecting couple about this period. According to WHO, safe motherhood initiative, a very few Asian countries follow this trend. Where on the other side it is seen that the maternal mortality ratio and infant mortality rate is high in these countries. Hence , after thorough research , WHO states the fact that ante natal care is an important part of safe motherhood.
The earlier a human taught is educated about some concepts, more beneficial it is to him. .

Review of literature:

1.)Nayak et al conducted a study at KMC hospitals, from December 2014-February2015 on " Awareness of ante natal exercises among pregnant women in tertiary care centers in Manglore, India ". The article was published in IJAMSCR volume 2, issue 3 April-June 2015.Pregnant women in the age group 18-40yrs in any trimester of their pregnancy who came for ante natal check-up were given a self administered questionnaire with their consent. The questionnaire was developed from previously reviewed questionnaires and validation from the respective field experts. The sample size of the study was 90 females whose awareness about antenatal exercises was assessed. Questions were asked about patient's demographic data, pregnancy history and questions about antenatal exercises. This study proved that knowledge about antenatal exercises is inadequate in pregnant women. 6

2.)Barun Patel et al carried out a cross sectional study among 384 pregnant women in the 3rd trimester of their pregnancy " A study on knowledge and practices of antenatal care among pregnant women attending antenatal clinic at a Tertiary Care Hospital of Pune, Maharashtra "The study was carried out at a tertiary care hospital at Pune from October 2011 to September 2012. Pretested questionnaire was used for interviewing the candidates after obtaining their informed consent. The study concluded that almost 41.9% females have inadequate knowledge about antenatal care and less than half of this population actually practices ante natal care routine. Certain aspects of ANC such as health checkups, screening, harmful effects of diabetes and addictions is not widespread and needs population education to be conducted. 7

3.)Manasi Ketkar et al conducted a study in Pune in 2013. It was titled as "Assessing internal consistency of ante natal care knowledge questionnaire" The study aimed to assess the internal consistency of a questionnaire titled "knowledge of ante natal care ". A pilot study was carried out using the questionnaire which was developed through research and was divided in two sections. The internal consistency was found out using SPSS which came as fair internal consistency. The study concluded that further revision is necessary for this questionnaire which will be helpful to assess how much information a pregnant women is having about her pregnancy.8

4.) Andualem Henok et al conducted a study on "Knowledge, Attitude and Practice of Antenatal Care Service among Married Women of Reproductive Age Group in Mizan Health Center, South West Ethiopia" . Cross sectional study was done amongst 255 married non parous and non gravid coming to

Mizan health centre from May to August 2014. The concluded that knowledge and attitude towards ante natal care was at a better position but practice was poor and requires further study of factors affecting practice.9

5.) Samuel Anya et al conducted a study in Gambia which was published in BioMed central in March 2008. The study was titled "Ante Natal care in The Gambia : Missed opportunity for information, education and communication". The study was a cross sectional survey amongst 457 pregnant women attending the largest health centre in The Gambia. The women were interviewed on ante-natal record review questionnaire and modified antenatal client exit interview from WHO's safe motherhood needs assesment kit. The study concluded that information ,communication and education was poor. Pregnant females were not informed about the danger signs to observe during pregnancy. All of this affects the maternal mortality ratio.10

Aim : Find out the awareness about antenatal care and classes in Indian females in the age group 18-30 years

Objective: formulation, face validation, content validation and reliability of the questionnaire

Methodology:

STUDY SETTING: Community

PARTICIPANTS: reproductive age group females

INCLUSION CRITERIA: 1.) 18-30 yrs females ,
2.)English-Literate females

EXCLUSION CRITERIA : 1.) Previously parous,
2.)Females below 18 years
3.)Females above 30 years
4.) Medical faculty(staff and students)

SAMPLE SIZE: 1.)Face validity:14 physiotherapists,
2.) Content valididity:2 community medicine experts,
2 physiotherapy CBR experts

3.)Reliability: 100 participants

PROCEDURE:

The motive behind developing this questionnaire was to create a questionnaire that assesses the awareness about antenatal care as well as antenatal classes in reproductive age group females.

The main idea for the questionnaire was inspired from some previously established questionnaires from the studies on awareness of antenatal care and classes that were based in Pune and Mangalore, respectively. The questionnaire was developed after reviewing previous articles and questionnaires based on similar subjects.

The original draft of the questionnaire included questions under three domains, Knowledge, attitude and Physiotherapy awareness. Under these domains, it had total 28 questions; 16 under knowledge, 3 under attitude and 9 under physiotherapy awareness. Questions for knowledge and physiotherapy awareness were verbal questions and the responses were graded into yes, no and don't know. The 5 responses to questions under attitude ranged from strongly agree to strongly disagree i.e. Likert scale.

This draft was distributed among the staff of DESBJCOP, Pune, for face validation. The third response for the verbal questions was changed from can't say to not sure. Broader terms were used to club a few questions. Certain questions were deleted or replaced or reframed in all three domains, as per the suggestions. The outline of the questionnaire was changed to table format except for the 1st question , which remained a multiple choice question. This draft was then given for content validation.

The content was validated by two assistant professors of preventive and social medicine & also by two practicing physiotherapists who have done masters in community based rehabilitation and are currently practicing. As per the suggestions, the questions were regrouped under the following domains:

1-Concept

2-Investigations

3-Immunization
4-Nutrition
5-Birth defects
6-Habits
7-Knowledge
8-Physiotherapy awareness.

The domain of attitude was excluded.

The final questionnaire was drafted accordingly. The final draft was then circulated amongst the sample group. The sample group was selected based on the inclusion and exclusion criteria in the study setting i.e. community.

The reliability of the questionnaire was then checked on SPSS latest version which calculated the data received from responses given by participants.

Result :

The latest version of statistical analysis app IBM SPSS was used to calculate reliability. The app used ANOVA with Cochran's test and calculated the Cronbach's alpha value as 0.96 for 100 items. This value of Cronbach's alpha concludes that the questionnaire is reliable

Discussion:

The original draft of the questionnaire was formulated with reference from the questionnaires in both the mother articles. This draft had questions divided into only three domains; those were, knowledge, attitude, physiotherapy awareness. The responses in this draft were expected to be as yes, no or can't say. It also included questions asking about sociodemographic details, such as, name, age, contact no.. Questions asking about the education and occupation of the respondent were also asked as these questions helped in segregating the inclusion and exclusion criteria participants. This draft was circulated amongst the staff of DES Brijlal Jindal College of Physiotherapy for face validation. They gave valuable suggestions about certain question formation, which helped in formulating questions that were unbiased and not leading towards answers. The answer option for "can't say" was changed to "not sure"(1st draft attached in appendix.

Heeding to the suggestions given during face validation , certain

changes were made in the questionnaire and the new draft was then entrusted for face validation to 2 experts of preventive social medicine and community based rehabilitation , respectively. All experts reviewed the draft and gave their guidance and recommendations. Based on this, certain question were again reframed , and now, they were clubbed according to their domain ,into 8 domains. The option of not sure was omitted for ease of scoring. These domains , the number of questions in each domain and their type were as follows:

1- concept- 1 question with multiple choice answer.
2-investigations- 4 questions with verbal answer
3-immunization- 1 question with verbal answer
4-Nutrition- 3 questions with verbal answer
5-Birth defects-- 1 question with 3 sub-questions, each requiring a verbal answer
6-Habits -- 3 questions with verbal answer
7-Knowledge- 3 questions with 3,8,3 sub-questions respectively, each requiring a verbal answer.
8-Physiotherapy awareness - 8 question with 3 and 8 sub-questions in question no.4 and 8 respectively. All the questions required verbal answeres.

The sub-questions in 3rd question under investigations were rearranged according to their importance as suggested by the experts.

The 4th question under investigations i.e." Are you aware that foetal movements and foetal heart rate can and should be monitored at home?" was split into two questions . These questions were " are you aware that foetal movements can and should be monitored at home?" & " Are you aware that foetal heart rate can and should be monitored at home?". Later, the question about foetal heart rate was omitted since foetal heart rate monitoring tools are not widely used at homes and also due to the cost factor.

A 3rd question was added in nutrition domain which assessed the knowledge about nutrition and its relation to birth defects.

After all the changes , suggestions and editing, a final draft was prepared. This draft inculded the title of the study, socio demographic details, education and occupation of respondents, all the above mentioned 8 domains and a consent form.

This final draft was circulated to the participants with their due consent. There were 100 participants. 46 out of 100 participants were given printed

copies of the final draft .Remaining were given google forms version of the final draft. All the responses were then entered as binary numbers into the data sheet in the latest version of statistical analysis app IBM SPSS . The app used ANOVA with Cochran's test and calculated the Cronbach's alpha value as 0.96 for 100 items. This value of Cronbach's alpha concludes that the questionnaire is reliable.

Conclusion:

The formulated questionnaire has been accepted for face and content validity.

The questionnaire has been proved to be reliable(value)

Clinical Implication:

It can be used in assessing knowledge of physiotherapy in ante natal period and ante natal care.

It can be used by physiotherapists conducting ante natal classes for screening .

Based on the data, several education lectures can be conducted to increase awareness about ante natal care and physiotherapy.

Future scope:

Translation of the questionnaire to other languages can be done, which can be used in non-English literate females.
It can be used to assess awareness in uneducated females on interview basis.

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Effect of Muscle Energy Technique v/s Positional Release Technique on Neck Pain and Disability in Hair Dressers with Trapeziusmyalgia– A Comparative Study

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ABSTRACT

Aims and objective-

To investigate the effectiveness of Muscle Energy Technique (MET) versus Positional Release Technique (PRT) over neck pain, disability and CROM in hairdressers with trapezius Myalgia.

Methods- Seventy-four subjects diagnosed with trapezius myalgia having neck pain meeting the inclusion criteria were assigned conveniently in the respective groups of muscle energy technique and positional release technique respectively. Neck pain, disability, and cervical range of motion were assessed using Visual Analog Scale (VAS), Neck Disability Index (NDI) and Universal Goniometer respectively.

Results-Comparison of pre-test and post-test scores of VAS in two Groups by paired sample Wilcoxon test. Comparison of pre-test and post-test scores of LF in both the Groups were done by paired sample Wilcoxon tests shows p-value for Group A and Group B which is less than 0.05. Hence, we can conclude that, there is significant change observed in Group A and Group B. The difference in effect size is 0.75, with group B having a higher effect size (1.61) compared to Group A (0.86). Comparison of pre-test and post-test scores of NDI in two Groups by paired sample Wilcoxon test which shows p-value for Group A and Group B which is less than 0.05. Hence, we can conclude that, there is significant change observed in Group A and Group B. The difference in effect size is 0.21, with group B having a higher effect size (3.56) compared to Group A (3.35).

Conclusion - The current study concluded that both the Positional Release Technique and Muscle Energy Technique showed significant improvement in pain intensity, physical functional abilities, and cervical ROM (range of motion) after eight therapy sessions. However, the Positional Release Technique was found to be more effective for these participants.

Keywords- trapezius Myalgia, hairdressers, neck pain. MET, PRT

INTRODUCTION-

Hairdressers represent a fast-growing group of professionals especially in urban India. Hairdressing typically involves the activities of hair colouring, hair cutting, hair texturing techniques, etc. separately or in combination. Hairdressers are at risk of lower back, neck, shoulder, arm, wrist, and foot injury [1). Hairdressers use both arms extensively. Poorly designed workplace, difficult work environment and poor ergonomic design of work tools have the potential to impact on hairdresser health. (2)

The neck is the most common site of non-traumatic musculoskeletal pain. [2] A study conducted in hairdressers showed that 26% hairdresser had neck pain as the most prevalent work-related musculoskeletal disorder followed by back pain.[1]

For people who work with more movements of the neck, or who spend many hours in doing same movement of neck, the upper trapezius becomes very painful and sore. [3]

Myalgia i.e., muscle pain can occur in any muscle. Trapezius Myalgia is severe pain in trapezius muscle. Patient experiences pain, stiffness, and tightness in the trapezius upper fibres. This condition is characterized by acute or chronic pain. [4] Myalgia is a common symptom, often escapes a specific etiologic diagnosis. [5]

Upper trapezius is designated as postural muscle. As the trapezius muscle works to move the neck in several directions. Any position which places trapezius in a shortened state for some time without rest may shorten the fibres and lead to dysfunction and restricted movements of the neck.

Manual techniques like MET muscle energy technique and PRT (positional release technique) can effectively trigger points and ease muscle spasms

and tightness. MET is type of manual therapy that involves isometric muscle contractions to help relax and lengthen and shortened trapezius muscle. (3) Muscle Energy Techniques (MET) are a form of soft-tissue, or joint, manipulations or mobilizations, deriving from osteopathic medicine, employed in the treatment of musculoskeletal dysfunction. MET is used to decrease pain, stretch tight muscles and fascia, reduce muscle tonus, improve local circulation, strengthen weak musculature, and mobilize joint restrictions. [6] MET is a method of treatment that involves the voluntary contraction of a subject's muscle(s) in a precisely controlled direction, against a counterforce provided by the operator. [7]

Many authors have proposed that MET and PNF techniques facilitate stretching by producing neurological reflex muscle relaxation following isometric muscle contraction. Muscle relaxation following contraction has been proposed to occur by activation of the Golgi tendon organs and their inhibitory influence on the a-motor neuron pool, or due to reciprocal inhibition produced by contraction of a muscle antagonist. Several studies have lent support for the concept of neurological muscle relaxation in MET by providing evidence of a strong, brief neuro-muscular inhibition following isometric muscle contraction. Studies support the proposition that MET may produce reflex inhibition to the a-motor neuron pool, and is consistent with many protocols which recommend 5-10 seconds of stretching following isometric contraction. [8]

Positional release therapy (PRT) can help to ease tightness and pain in upper back and neck by addressing fascial restrictions in the trapezius muscle. Positional Release Therapy (PRT) is also known as strain counter stain therapy i.e. manual therapy which increases the flexibility of muscle by keeping the muscle in shortened position for further muscle relaxation. PRT positions the muscle in position of comfort for a period of 90 seconds while maintaining a sustained manual pressure. [9]

Positional release technique (PRT) depends on accurate positioning of dysfunctional tissues in ways that allow a spontaneous response that releases or reduces excessive tension and/or spasm. PRT decreases joint hypo mobility, increases circulation, followed by a reduction in swelling, decreased pain, and increase muscle strength. [3] PRT is thought to decrease tissue tenderness by altering nociceptor activity in the soft tissues. PRT techniques have the capacity to provide immediate relief of tenderness and local pain. [10]

METHODOLOGY -

The study design was experimental in nature and the type of study was comparative study. The method of sampling was convenient. Total 74 subjects were selected based on the inclusion and exclusion criteria, divided into two groups group A was of positional release therapy(n=37) and group B was of muscle energy technique (n=37) and a total eight sessions were given accordingly. The subjects were taken from saloons from the respected city,
The inclusion criteria were both genders of the age from 18 to 35 years who had neck pain and restricted ROM and working for more than 8 hours a day, VAS-3-6 AND NDIQ- 13-25 Diagnostic criteria -Presence of palpable taut band in trapezius muscle, Presence of hypersensitive tender spot in the taut band, Local twitch response elicited by snapping palpation of taut band, Reproduction of referred pain pattern in response to compression.The Exclusion criteria included Fracture in Cervical Vertebrae within 1 year, Recent cervical spine surgery, neck deformities, radiculopathy and myopathy, patients on NSAIDS.
The outcome measures used for pain was Visual analog scale (VAS), cervical range of motion (CROM) and for neck disability Neck disability index questionnaire (NDIQ).

RESULT –

The presented study titled Effect of muscle energy technique v/ s positional release technique on neck pain and disability in hair dressers with trapezius myalgia– a comparative study included 74 participants. The assessment for neck pain was done using visual analog scale (VAS), cervical range of motion was done using cervical goniometer and neck disability was assessed using neck disability index questionnaire (NDIQ). Statistical analysis for the present study was done manually using statistical package of social sciences (SPSS) 20 so as to verify the results obtained. Statistical measures such as mean, Shapiro-wilk test was done to assess data normalcy where it was observed that data set is not normally distributed as all the variables have not indicated p-value greater than 0.05 in the observation therefore non-parametric tests were used for intra group and inter group analysis. Comparison of pre-test and post-test scores of VAS in two Groups was done by using Wilcoxon Signed Rank Test which showed p-value for Group A and Group B which is less than 0.05. Hence, we can conclude that, there is significant change observed in Group A and Group B. The effect size (Cohen's D) for Group B (2.42) is slightly higher than Group A (2.22). A higher effect size suggests a larger impact of the treatment.

Comparison of pre-test and post-test scores of NDI in two Groups was done by Wilcoxon Signed Rank Test which showed p-value for Group A and Group B which is less than 0.05. Hence, we can conclude that, there is significant change observed in Group A and Group B. The difference in effect size is 0.21, with group B having a higher effect size (3.56) compared to Group A (3.35). Both Group A and Group B showed significant improvements after the treatment. However, group B exhibited a slightly larger effect size, suggesting a greater improvement compared to Group A.

Comparison of pre-test and post-test scores of Right lateral flexions (RLF) in two Groups was done which showed p-value for Group A and Group B less than 0.05. Hence, we can conclude that, there is significant change observed in Group A and Group B, The difference in effect size is 0.33, with group A having a higher effect size (1.73) compared to Group B (1.40) Both Group A and Group B showed significant improvements after the treatment. However, group A exhibited a slightly larger effect size, suggesting a greater improvement compared to Group B.
Comparison of pre-test and post-test scores of Left lateral flexion (LLF) in two Groups was done using Wilcoxon Signed Rank Test showed p-value for Group A and Group B which is less than 0.05. Hence, significant change was observed in Group A and Group B. The effect size (Cohen's D) for Group A (1.49) is slightly higher than Group B (1.19) which suggested a larger impact of the treatment. While the difference in effect size is small, it suggests group A may have experienced a bit more improvement on average compared to group B.

Comparison of pre-test and post-test scores of Flexion in two Groups was done using Wilcoxon Signed Rank Test which showed p-value for Group A and Group B which is less than 0.05. Hence, we can conclude that, there is significant change observed in Group A and Group B. The difference in effect size is 0.75, with group B having a higher effect size (1.61) compared to Group A (0.86), Both Group A and Group B showed significant improvements after the treatment. However, group B exhibited a slightly larger effect size, suggesting a greater improvement compared to Group A.

Comparison of pre-test and post-test scores of extension in two Groups by paired sample Wilcoxon test which showed that p-value for Group A and Group B which is less than 0.05. Hence, we can conclude that, there is significant change observed in Group A and Group B.

The effect size (Cohen's D) for Group B (1.20) is slightly higher than Group A (1.03). A higher effect size suggests a larger impact of the treatment. While the difference in effect size is small, it suggests group B may have experienced a bit more improvement on average compared to group A.

DISCUSSION -

The aim of present study was to find the effect of muscle energy tech-

Table no. 1 Comparison of pre-test and post-test scores of VAS in two Groups by paired sample Wilcoxon test.

Groups	Times	Mean	SD	Mean Diff.	SD Diff.	Effect size	z-value	p-value
Group A	Pre	4.73	0.55	1.47	0.66	2.22	5.162	0.001
	Post	3.26	0.59					
Group B	Pre	4.97	0.48	1.97	0.81	2.42	5.306	0.001
	Post	3.00	0.63					

Table no. 2 Comparison of pre-test and post-test scores of NDI in two Groups by paired sample Wilcoxon test

Groups	Times	Mean	SD	Mean Diff.	SD Diff.	Effect size	z-value	p-value
Group A	Pre	16.51	2.60	7.08	2.11	3.35	5.320	0.001
	Post	9.43	1.89					
Group B	Pre	17.65	2.34	7.65	2.15	3.56	5.327	0.001
	Post	10.00	1.93					

Table no.3 : Comparison of pre-test and post-test scores of RLF in two Groups by paired sample Wilcoxon test.

Groups	Times	Mean	SD	Mean Diff.	SD Diff.	Effect size	z-value	p-value
Group A	Pre	28.00	4.52	7.32	4.24	1.73	5.072	0.001
	Post	35.32	4.06					
Group B	Pre	32.19	4.78	6.38	4.57	1.40	4.885	0.001
	Post	38.57	4.44					

Table no. 4 Comparison of pre-test and post-test scores of LLF in two Groups by paired sample Wilcoxon test.								
Groups	Times	Mean	SD	Mean Diff.	SD Diff.	Effect size	z-value	p-value
Group A	Pre	29.22	5.65	6.27	4.21	1.49	4.962	0.001
	Post	35.49	4.70					
Group B	Pre	32.27	5.17	5.76	4.86	1.19	4.559	0.001
	Post	38.03	4.77					

Table no. 5 Comparison of pre-test and post-test scores of FLEXION in two Groups by paired sample Wilcoxon test								
Groups	Times	Mean	SD	Mean Diff.	SD Diff.	Effect size	z-value	p-value
Group A	Pre	61.92	6.82	6.32	7.35	0.86	4.322	0.001
	Post	68.24	7.87					
Group B	Pre	63.24	4.75	7.78	4.85	1.61	4.959	0.001
	Post	71.03	6.70					

Table no. 6 Comparison of pre-test and post-test scores of EXTENSION in two Groups by paired sample Wilcoxon test.								
Groups	Times	Mean	SD	Mean Diff.	SD Diff.	Effect size	z-value	p-value
Group A	Pre	52.59	5.37	3.76	3.65	1.03	4.246	0.001
	Post	56.35	4.51					
Group B	Pre	51.27	7.11	6.05	5.06	1.20	4.576	0.001
	Post	57.32	7.86					

nique v/s positional release technique with respect to VAS, NDI, CROM on neck pain and disability in hair dressers with trapezius myalgia. 74 participants were randomly divided in 2 groups, group A received Muscle Energy Technique (MET) and group B received Positional Release Technique (PRT). The intervention lasted for 2 weeks (8 sessions).

The emphasis was given on to reduce pain and disability in trapezius muscle of neck and to improve cervical ROM of the subjects to improve their performance. The pain was measured using VAS (reliability of 0.97), disability was measured using NDI (reliability of 0.9), and CROM was measured using universal goniometer (reliability of 0.98). Scores were recorded pre intervention and post intervention i.e. after 8 sessions for every subject in both groups.

In present study 74 participants were included out of which 53 were male and 21 were female. There was non-significant difference between the groups which shows there was homogeneity in term of gender distribution between groups. In a previous study conducted by Sukhdev Mishra et al; concluded that the proportion of male workers were higher in comparison to female workers. Historically, male-dominated apprenticeships under master hairdressers limited women's entry into the field, leading to a scarcity of female role models and perpetuating the gender imbalance in hairdressing.[1]

In the present study, the age group ranged between 18 to 35 years. The mean age group in group A is 26.62 and in group B is 27.24. There was a statistically non-significant difference seen for the values between the groups ($p>0.05$). Supporting our study, a study conducted by Bosede et al; also stated that Hairdressers within the age of 18-35 years had significantly higher occurrence of musculoskeletal disorders with longer duration of working hours at the workplace.[16] Longer daily work hours (>8 hours) posed significantly higher risk of experiencing MSD for hairdressers. According to a study conducted by Zafar et al. (2022), long working hours are associated with an increased risk of musculoskeletal disorders. This is likely due to prolonged standing and poor ergonomics, which can strain the neck and body muscles, particularly those in the dominant hand. The repetitive nature of these postures over long periods can limit neck mobility.[17]

J.M.Porter et al; conducted a study which concluded that there were 5 major occupational risk factors identified in the task which included: working in the same position for long periods, attending to a large number of customers

in 1 day, work schedules, not having sufficient rest breaks during the day and performing the same task over and over which led to Musculo skeletal neck pain in hairdressers.[18] Nipa Patel et al; mentioned that the neck is the most common site of nontraumatic musculoskeletal pain. Because the trapezius muscle works to move the neck in several directions, its degree of tightness or looseness affects neck flexibility.[3]

Brite et al; conducted a study in 2021 which stated that Working postures with the neck in extreme flexion increase the load moment three to four times on the neck causing spasm of the neck muscles. Also working tasks that involve continuous arm movements always generate a static load component on these muscles, the principal muscle to carry this load is the trapezius. Muscle spasm occurs early after inflammation. This feels like tightness in the muscles and is sometimes painful. When basic injury is not treated, spasm causes formation of muscle knots, called trigger points. The knots form because the spasm keeps the muscle continuously under tension. As muscles are not designed for this continuous work, over a period the muscle gets overloaded and forms these knots.[19]

Graph 3a and table 4a shows the intragroup comparison of VAS for Group A where mean value for pre intervention is 4.73 and post is 3.26 with $p<0.05$, highlighting reduction is VAS score which shows statistically significant difference in pre and post values of VAS in Group

A. Graph 3b and table 4b show the intragroup comparison of VAS for Group B where mean value for pre intervention is 4.97 and post is 3.00 with $p<0.05$, highlighting reduction is VAS score which shows statistically significant difference in pre and post values of VAS in Group

B. Table no. 4c and graph 3c shows intergroup comparison of p-value for Group A and Group B which is less than 0.05. Hence, it concludes that, there is significant change observed in both groups. The effect size (Cohen's D) for Group B (2.42) is slightly higher than Group A (2.22). A higher effect size suggests a larger impact of the treatment. Intergroup comparison of Group A and Group B for VAS showed that Group B has larger impact on the subjects than Group A.

The reason behind the above result is as Muscle Energy Technique (MET) and Positional Release Technique (PRT) both are manual therapy techniques that address restricted movement in different ways, as MET utilizes the

body's natural reflexes mediated by stretch receptors. When a muscle is overstretched, Golgi tendon organs (GTOs) fire, inhibiting the muscle and promoting relaxation. Muscle spindles also play a role, potentially contributing to further relaxation when muscles are shortened. This improves range of motion and potentially reduce pain by normalizing sensory input from the muscles (proprioception). PRT, on the other hand, focuses on sustained positioning to target tight tissues. This can improve blood flow to the area, promoting healing and reducing inflammation. The gentle pressure applied during PRT might also decrease muscle spasm. Additionally, PRT may influence the nervous system, potentially modulating pain signals or promoting relaxation. Ultimately, both MET and PRT can improve mobility and manage pain, with MET focusing on muscle relaxation through reflex activation and PRT targeting circulation, inflammation, and potentially the nervous system through sustained positioning.[3] A study conducted by, Dr. Priyanka Rana et al. (2017) compared the effectiveness of Positional Release Technique (PRT) and Muscle Energy Technique (MET) in reducing pain and tightness of the upper trapezius muscle in computer workers with spasm showed similar findings. Which suggest that PRT was more effective than MET in relieving pain and tightness. While both techniques improve movement and comfort, but PRT might be a better choice for this specific problem.[20]

Graph 4a and table 5a shows the intragroup comparison of NDI for Group A where mean value for pre intervention is 16.51 and post is 9.43 with $p<0.05$, highlighting reduction is VAS score which shows statistically significant difference in pre and post values of NDI in Group A. Graph 4b and table 5b show the intragroup comparison of NDI for Group B where mean value for pre intervention is 17.65 and post is 10.00 with $p<0.05$, highlighting reduction is NDI score which shows statistically significant difference in pre and post values of NDI in Group B. Table no. 5c and graph 4c shows intergroup comparison of p-value for Group A and Group B which is less than 0.05. The effect size (Cohen's D) for Group B (3.56) is slightly higher than Group A (3.35). Both Group A and Group B showed significant improvements after the treatment. However, group B exhibited a slightly larger effect size, suggesting a greater improvement compared to Group A. PRT involves passive body positioning, which is claimed to elicit immediate and prolonged reductions in tenderness at trigger points and to reduce pain and with musculoskeletal conditions. Thus, PRT is an effective method for relieving pain in upper trapezius muscle. [20] Sai Vispute et al; conducted a study on Immediate Effects of Myofascial Release Technique and Positional Release Technique on Trapezitis among the College Student which concluded both were equally effective in

reducing pain and disability which was measured on VAS and NDI scale. [21]

Table no. 6c and graph 5c shows intergroup comparison of p-value for Right Lateral Flexion (RLF) Group A and Group B which is less than 0.05. Hence, it concludes that, there is significant change observed in Group A and Group B. The difference in effect size is 0.33, with group A having a higher effect size (1.73) compared to Group B (1.40) Both Group A and Group B showed significant improvements in RLF after the treatment. However, group A exhibited a slightly larger effect size, suggesting a greater improvement compared to Group B. Table no. 7c and graph 6c shows intergroup comparison of p-value for Left Lateral Flexion for Group A and Group B which is less than 0.05. Hence, we can conclude that, there is significant change observed in Group A and Group B. The effect size (Cohen's D) for Group A (1.49) is slightly higher than Group B (1.19). A higher effect size suggests a larger impact of the treatment. While the difference in effect size is small, it suggests group A may have experienced a bit more improvement on average compared to group B. Following research suggests that Muscle Energy Technique (MET) is more effective than Positional Release Technique (PRT) in improving lateral flexion for individuals with tight trapezius muscles. This attributed to several factors. MET techniques place the trapezius in a lengthened and relaxed state, promoting greater flexibility and range of motion. Additionally, MET allows for a more targeted approach to the trapezius and may enhance proprioception through active patient participation. Studies have also shown that MET can be more effective than PRT for improving flexibility in various muscle groups.[3] A study conducted by Ronald Schenk et al; stated that met is an effective method to increase cervical ROM. [22] Also, a study done by Thaker et al. concluded that the Muscle energy technique (MET) is an effective option in the treatment of chronic upper Trapezitis with reduce lateral flexion than the Positional Release Technique (PRT). [23]

Table no.8c and graph 7c shows p-value for Flexion in Group A and Group B which is less than 0.05. Hence, we can conclude that, there is significant change observed in Group A and Group B. The difference in effect size is 0.75, with group B having a higher effect size (1.61) compared to Group A (0.86) Both Group A and Group B showed significant improvements after the treatment. However, group B exhibited a slightly larger effect size, suggesting a greater improvement compared to Group A. Table no.9c and graph 8c shows p-value for Extension in Group A and Group B which is less than 0.05. Hence, we can conclude that, there is significant change observed in Group A and Group B. The effect size (Cohen's D) for Group B (1.20) is slightly higher than

Group A (1.03). A higher effect size suggests a larger impact of the treatment. While the difference in effect size is small, it suggests group B may have experienced a bit more improvement on average compared to group A. Our study suggests that Positional Release Technique (PRT) is more effective than Muscle Energy Technique (MET) in improving cervical flexion and extension range of motion (ROM).

The findings of the present study are consistent with prior research conducted by Priyanka Rishi et al (2019), who demonstrated that positional release therapy (PRT) is an effective therapeutic approach for improving the range of motion, physical functionality, and pain tolerance in individuals experiencing cervical originated headaches.[24] Additionally, a study by Kamrani Faraz et al found that incorporating PRT techniques alongside neck stabilization exercises significantly reduced pain intensity and enhanced range of motion among men with a history of chronic neck pain. These findings underscore the efficacy and potential benefits of utilizing PRT techniques, either alone or in conjunction with other interventions, for managing musculoskeletal conditions such as cervical originated headaches and chronic neck pain.[25]

CONCLUSION - The following study concluded that both the groups using Positional Release Technique and Muscle Energy Technique showed significant improvement in pain intensity, physical functional abilities, and cervical ROM (range of motion) after eight therapy sessions. However, the Positional Release Technique was found to be more effective for these participants.

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Digital App-Based Balance and Gait Improvement in Patients with Parkinson's Disease A Systematic Review

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Abstract

Parkinson's Disease (PD) is a progressive neurodegenerative disorder characterized by motor dysfunctions, including impaired balance and gait. These deficits significantly affect patients' mobility, leading to an increased risk of falls and reduced quality of life. Recent advancements in digital health technologies, particularly mobile applications (apps), have provided an innovative platform for improving balance and gait in PD patients. This systematic review aims to examine the effectiveness of app-based interventions for balance and gait improvement in individuals with Parkinson's Disease. By synthesizing evidence from randomized controlled trials (RCTs), observational studies, and clinical trials, this review evaluates the efficacy, usability, and safety of such interventions.

Keywords:

Parkinson's Disease, Balance, Gait, Mobile App, Digital Health, Rehabilitation, Virtual Reality, Biofeedback, Falls

Introduction

Parkinson's Disease (PD) is a progressive neurodegenerative disorder primarily characterized by motor symptoms such as bradykinesia (slowness of movement), rigidity, tremor, and postural instability. Among these, impaired

balance and gait pose significant challenges, as they not only contribute to frequent falls but also result in reduced independence and increased mortality. To address these symptoms, traditional interventions like physical therapy, exercise programs, and pharmacological treatments have been widely utilized.1, 2, 3 However, these conventional approaches often face limitations such as accessibility issues, high costs, and challenges with patient adherence, particularly in the long term. For example, patients may struggle with attending regular therapy sessions due to transportation difficulties or the financial burden of ongoing treatment. Additionally, the need for sustained effort and motivation can lead to inconsistent participation in rehabilitation programs. In response to these challenges, digital apps focused on balance and gait rehabilitation have emerged as a promising alternative.These apps offer a range of benefits, including personalized exercises tailored to the individual's specific needs and abilities, as well as real-time feedback that allows patients to adjust their movements and posture on the spot. Such immediate feedback can be especially valuable for patients with PD, who may have difficulty perceiving and correcting motor deficits. Furthermore, these digital solutions offer the convenience of access from home, helping to eliminate the barriers of travel and scheduling conflicts, which can improve adherence and engagement. By integrating personalized interventions with real-time monitoring, digital apps provide a cost-effective and accessible means of supporting balance and gait rehabilitation in PD patients, potentially enhancing the quality of life and overall functional mobility.4,5 In recent years, virtual reality (VR) has emerged as a cutting-edge tool for rehabilitation in PD patients, particularly for improving balance and gait. VR immerses patients in simulated environments, allowing them to engage in interactive tasks that challenge their motor skills in a safe and controlled setting. This type of rehabilitation is highly engaging and provides patients with visual, auditory, and kinesthetic cues that can enhance motor learning. VR-based exercises, such as walking through virtual environments or performing specific movements, can stimulate the brain's neural plasticity and improve motor coordination. By simulating real-life situations, VR rehabilitation helps patients improve balance and gait while maintaining their cognitive engagement, which can lead to greater retention of motor skills. The interactive nature of VR also fosters motivation and adherence, addressing one of the key challenges in traditional therapy. Studies have shown that VR can improve gait parameters, reduce freezing of gait, and enhance the overall stability of PD patients, making it a promising tool for both short-term and long-term rehabilitation.6,7

Exergaming, or exercise-based gaming, has also gained traction as a digital intervention for improving balance and gait in individuals with Parkinson's Disease. Exergaming combines physical exercise with video games, using motion-sensing technology to track and respond to the player's movements. This type of rehabilitation allows patients to perform exercises that mimic real-world motions, such as walking, balancing, or stepping, while simultaneously engaging with a game-like interface. Exergaming has been shown to improve motor function, balance, and mobility by providing a fun and interactive environmentfor patients to exercise. The engaging nature of exergames promotes greater participation, encourages adherence, and offers patients the ability to progress at their own pace. Additionally, exergaming can be easily adapted to different levels of severity in PD, making it a versatile tool for rehabilitation. Its accessibility and ability to be used in the home environment further enhance its potential for long-term use, making it a valuable complement to traditional therapies.8

Biofeedback is another promising technology used to improve balance and gait in PD patients. Biofeedback involves providing real-time data about the body's physiological functions, such as movement patterns, muscle tension, or posture, which can help patients become more aware of their motor deficits and correct them. In the context of PD, biofeedback can be used to monitor and improve gait patterns, posture, and balance by providing auditory, visual, or tactile cues when patients deviate from optimal movement. For example, sensors can detect improper posture or abnormal gait and provide feedback to encourage corrections. This method has been shown to improve motor control by enhancing the patient's ability to consciously modify their movements. Biofeedback can be delivered through wearable devices or integrated into digital apps, making it a versatile tool for rehabilitation. This technique's effectiveness is enhanced by its ability to provide immediate feedback, which allows for quick adjustments and reinforcement of proper movement patterns.9

Mobile apps dedicated to Parkinson's Disease rehabilitation are increasingly being used to improve balance and gait. These apps offer a wide range of features, from exercise routines and motor assessments to real-time monitoring and feedback. Many apps use sensors embedded in smartphones or connected devices to track movement and provide feedback on posture and gait. The advantage of these mobile apps is that they can be used in a variety of settings, whether at home or in the community, offering patients the flexibility to engage in rehabilitation activities whenever convenient. Mobile apps can also offer customized exercise plans based on the individual's needs and progress, help-

ing to improve both short-term and long-term motor function. The ease of use and affordability of these apps, compared to traditional therapies, make them a highly accessible option for patients with PD. Moreover, the integration of features such as progress tracking, reminders, and motivational elements can boost patient adherence and engagement, which is crucial for effective rehabilitation. As part of a holistic treatment approach, mobile apps can play a key role in supporting patients' efforts to maintain or improve their balance and gait, ultimately enhancing their quality of life.10,11,12

Objective

The objective of this systematic review is to evaluate the effectiveness of digital app-based interventions in improving balance and gait in patients with Parkinson's Disease by analyzing existing studies and identifying key trends, strengths, and limitations.

Methodology

1.Search Strategy

A systematic search was conducted in multiple electronic databases including PubMed, Scopus, Web of Science, and Cochrane Library. The following search terms were used: "Parkinson’s Disease", "balance", "gait", "digital health", "mobile app", "digital intervention", and "rehabilitation". Studies published in English between 2010 and 2024 were included.

2.Eligibility Criteria

Studies included in this review had to meet the following criteria:

Be randomized controlled trials, clinical trials, or observational studies.

Involve participants diagnosed with Parkinson’s Disease.

Evaluate the effectiveness of mobile app-based interventions for improving balance and gait.

Report on relevant outcome measures such as gait speed, postural stability, fall frequency, or balance scores.

Be published in peer-reviewed journals.

Exclude studies focusing on other conditions, or those that did not use mobile app-based interventions.

3.Data Extraction and Analysis

Data extracted from eligible studies included information about the sample size, design, type of app-based intervention (e.g., exercise programs, virtual reality, biofeedback), intervention duration, outcome measures, and key findings. A narrative synthesis of the evidence was performed, focusing on the impact of app-based interventions on balance and gait in PD patients.

4.Risk of Bias Assessment

The risk of bias in the included studies was assessed using the Cochrane Risk of Bias tool, which evaluates randomization, blinding, and other methodological factors.

Results

1.Study Characteristics

A total of 15 studies were included in the review, consisting of 10 randomized controlled trials (RCTs) and 5 observational studies. The studies varied in sample size, with a range of 10 to 150 participants, and intervention duration ranged from 4 to 24 weeks.

2.Types of Digital Interventions

The app-based interventions in the included studies were diverse, with the following types:

Exercise-Based Apps: These apps provided structured physical exercises designed to improve balance and gait. Many included video demonstrations, step-by-step instructions, and the ability to track progress.13

Virtual Reality (VR) and Gamified Apps: VR-based interventions used immersive environments to challenge balance and gait through interactive tasks. Gamified apps provided a game-like experience to increase motivation and engagement during rehabilitation.14

Biofeedback and Sensor-Based Apps: These apps used wearable sensors to track gait and postural stability, providing real-time feedback on movement patterns, which helped users improve motor function through corrective cues.15

3.Effectiveness of Interventions

Balance Improvement: Several studies found significant improvements in balance following app-based interventions. For example, one RCT involving an exercise app showed improved balance scores (Berg Balance Scale) after 12 weeks of use, with participants demonstrating better postural stability and reduced risk of falls.16

Gait Improvement: Most studies reported improvements in gait parameters, including increased gait speed, stride length, and cadence. One notable study using a sensor-based app showed enhanced gait speed by 0.1 m/s and greater stride length after 8 weeks of intervention.17

Falls Reduction: A few studies focused on fall frequency and demonstrated a reduction in falls, likely due to improved balance and gait. However, the evidence on fall reduction was less consistent, with some studies reporting no significant difference.18

4.Adherence and Usability

High adherence rates were reported in several studies, with participants using the apps several times a week. Usability assessments indicated that the apps were generally well-received, with most users finding them user-friendly. However, some studies highlighted challenges related to device compatibility, technical issues, and difficulty following exercises without in-person supervision.19

5.Safety

App-based interventions were generally safe, with few adverse events reported. One study reported mild discomfort in participants with severe motor impairments using sensor-based apps, but no serious complications were observed.20,21

Discussion

The findings of this review suggest that digital app-based interventions can offer substantial improvements in balance and gait among patients with Parkinson's Disease (PD). These interventions, which often integrate exercise programs, virtual reality (VR), or biofeedback, have shown positive effects on motor function. The integration of VR, for example, provides an immersive experience that enhances motor learning, while biofeedback offers real-time information that helps patients adjust their movements for better control and coordination. The added benefits of digital apps, such as accessibility and cost-effectiveness, make them particularly attractive for PD patients who may face barriers to traditional therapies, such as financial constraints or limited access to healthcare facilities. Furthermore, digital apps can help foster long-term engagement and adherence by offering convenient, home-based interventions that patients can use consistently, thereby reducing the likelihood of missed sessions. However, the review also highlights several challenges. Variations in app design, the duration of interventions, and the outcome measures used across different studies make it difficult to draw direct comparisons or generalize the findings. These discrepancies point to the need for more standardized research protocols to evaluate the efficacy of these interventions. Additionally, there is a need for further research to identify the most effective types of digital interventions, particularly those that can be tailored to individual needs. Investigating the long-term effects of these interventions and exploring the potential of personalized, adaptive apps will be crucial in refining treatment strategies and enhancing patient care in the future.

Conclusion

Digital app-based interventions represent a promising approach to improving balance and gait in Parkinson's Disease patients. These technologies offer significant advantages in terms of accessibility, engagement, and cost, and they can be integrated into personalized rehabilitation programs. While the evidence is generally supportive of their use, further research with larger sample sizes and standardized methodologies is necessary to confirm their effectiveness, safety, and long-term benefits.

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Comparison of Immediate Effect of Instrument Assisted Soft Tissue Mobilization (IASTM) with MFR in Gastrocnemius Tightness-A Randomized Controlled Trial

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Background and objectives-

The gastrocnemius muscle tightness is common clinical musculoskeletal disorder. The goal of the procedure is to increase ankle dorsiflexion when ankle movement is restricted by a contracted gastrocnemius muscle. The objective of the study is to evaluate the effect of comparison of IASTM and MFR in having gastrocnemius muscle tightness. Method: Total 60 participants from T.M.V Jayantrao Tilak college of Physiotherapy, Pune were selected on the basis of inclusion and exclusion criteria. Participants were divided into two groups. Group A containing 30 participants received the IASTMMR and Group B containing 30 participants received MFR only. Result: Post intervention both groups had significant reduction in pain (p0.001) IASTMMFR (0.001) score along with significant improvement in ROM value measured with goniometer. However in inter group comparison MFR showed significant improvement which showed decrease in ROM values. Conclusion :After analyzing the result it is conducted that IASTMMFR along with only MFR both have shown statistical improvement within the group and both can be used as treatment of gastrocnemius muscle tightness. While comparing between the groups,MFR only significantly improve compared to IASTMMFR in terms of pain and ROM values.

Keywords:

IASTM, MFR, Gastrocnemius muscle tightness, NPRS, ROM.

INTRODUCTION-

One of two main muscles that make up the calf is gastrocnemius, which is found on the back of lower leg The soleus, the second major calf muscle , is a flat muscle that sits beneath gut. It is the main muscles in legs calf, which flexes the foot and knee. It extends from two heads connected to the femur to the Achilles tendon. As a complex network of muscles and associated fascia, the system facilitates proprioception, nociception, fibroblastic activity, muscular force transmission and the reduction of compartmental friction during movement through the sliding of fascial layers. Myofascial system restriction can be brought on by an injury, bad posture, or limited range of motion. This method is intended to relieve constraints that might limit motion in all body parts and create pain, such as trigger points, muscles stiffness, and soft tissue dysfunctions. It hass been effective in improving mobility and reducing discomfort. Positive structural improvements, including improved range of motion, less pain, and most importantly increased fascial mobility, can be achieved by using gentle hands on techniques on the entire body MFR can assist patients in resuming their everyday and leisure activities when used in conjunction with conventional physical treatment

James Cyrix developed the theory behind Instrument Assisted Soft Tissue Mobilization (IASTM), a well liked treatment for myofascial restriction. In contrast to the Cyrix method, which uses digital cross friction, IASTM is administered with specially made tools to mobilize soft tissue, reducing pain and enhancing function and range of motion (ROM). By enabling deeper penetration and more targeted treatment, the tool is believed to give the clinician a mechanical edge... To detect and address myofascial restriction , number instrument assisted soft tissue mobilization groups employ specially made tools. Graston, Gavilan, Grips, functional and kinetic treatment and rehabilitation ,Adhesion breakers ,and among the IASTM equipment and companies that have their own distinct methods for treatment and instrument design are Fascial Abrasion Technique.

Buffalo Horn These tools are used by Chinese Gua Sha expert but can be used for IASTM tool It doesn't reverberate well, though. Very affordable to acquire. Jade Equipment heavier and more slick than the tool mentioned earlier. If it falls, it can break easily. Tools Made of Stainless Steel ideal instruments for IASTM .An essential tool for physical therapists. When the steel goes over the tissue, it echoes well. varies in size according to the firm making it for various body sections. To aid in the tissues' remodeling and adaptation soft tissue mobi-

lization must incorporate both strength and motion (BLACK, 2010). The following six steps steps are typically involved using IASTM in sports rehabilitation: assessment, warmup, IASTM, stretching, strengthening exercises, and cryotherapy. Drinking enough water is necessary both before and after using IASTM. Consuming fluids helps the blood supply to the injured tissue so that nutrients and oxygen can be delivered more easily. Specifically, consuming hydrogen rich water can speed up the healing process by reducing inflammation and oxidative stress caused by the injury.

Need for the study-

Reducing pain, releasing tightness, and increasing range of motion are critical for ankles with tight gastrocnemius muscles. Gastrocnemius muscle tightness may lead to plantar fasciitis and it leads to a decrease range of motion increasing so it is necessary to treat gastrocnemius tightness IASTM is effective in release in tightness and reduce pain motion. this study the effectiveness of IASTM or MFR in gastrocnemius tightness in healthy individuals. is to be studied.

AIM AND OBJECTIVES

AIM: To compare the immediate effectiveness of IASTM with MFR and MFR only in Gastrocnemius tightness

OBJECTIVES:

1. To evaluate the effect of comparison of IASTM and MFR in patients having gastrocnemius tightness.

2. To examine the which technique improve range of motion.

3.To Look over the which technique is effective in reduce pain.

4.To Inspect whether IASTM is effective in patients having gastrocnemius muscle tightness

HYPOTHESIS
NULL HYPOTHESIS

IASTM along with MFR and MFR only effective in gastrocnemius tightness.
IASTM along with MFR and MFR only not effective in gastrocnemius tightness

ALTERNATE HYPOTHESIS

Comparison of Immediate Effect of Instrument Assisted Sof Tissue Mobilization with MER in Gastrocnemius Tightness
RESEARCH QUESTION: Among IASTM with MFR and MFR only in Gastrocnemius muscle which technique is more effective on Gastrocnemius tightness

METHODOLOGY

SOURCE OF DATA: Students of TMV college and patients of TMV OPD receiving physiotherapy treatment.

STUDY SETTING: TMVs College OF Physiotherapy
METHOD OF DATA COLLECTION: Data will be by the primary investigator.
STUDY DESIGN: Experimental study
SAMPLE SIZE: 60

TARGET POPULATION: individuals between age of 20 to 50 years
SAMPILING METHOD: Simple Random Sampling. STUDY DURATION :3 weeks MATERIAL USED:

1. Consent form

2. NPRS

3. Data collection sheet

EQUIPMENTS TO BE USED: 1 Goniometer 2 IASTM Tool

SELECTION CRITERIA
INCLUSION CRITERIA

1. Age group between 20 to 50 years
2. Both genders will be included
3. Being able to cooperate
4. Having a gastrocnemius tightness

EXCULSION CREITERIA

1.Patient who are having ankle joint injuries

2.Patient with fracture of knee and ankle joint

3Patient having chronic gastrocnemius muscle

OUTCOME MEASURES

Pain

Range of motion

PAIN:

The numerical pain rating scale (NPRS) is a tool used to quantify a patient's level of pain as well as other characteristics. A ubiquitous tool for medical communication, pain scales are employed in a range of medical situations. In order to improve pain screening and assessment, pain scales are essential. Measurements of pain aid in identifying the kind, intensity, and duration of the discomfort and are utilized to establish a treatment plan and produce an accurate diagnosis. Determine a treatment plan, and evaluate the effectiveness of treatment. GONIOMETER: It is an instrument used to measure the range of motion. Measurement of DF associated with a wide variation in measurement protocols, Frequently, clinical measurements are performed on a number of occasions by different clinicians A range of devices have been reported, from simple plastic protractors to complex three dimensional motion systems, for the measurement of ankle dorsiflexion. The universal goniometer remains the most widely used instrument to measure ankle joint dorsiflexion, It is simple to use, noninvasive, and inexpensive The device records two dimensional angular, ankle displacement, such as ankle dorsiflexion,

A common treatment for myofascial limitation is instrument assisted soft tissue mobilization (IASTM), which was justified by James Cyrix. IASTM is performed with specifically made tools to provide a mobilizing action to soft to reduce pain and enhance range of motion and function, in contrast to the Cyriax method, which uses digital cross friction. By enabling deeper penetration and more targeted treatment, the tool is believed to give the clinician a mechanical edge while simultaneously lessening the strain on the hands.

It is hypothesized that using tools for soft tissue mobilization will enhance the patient's and clinician's feeling of vibration. The two-minute treatment period was based on the foam rolling comparison intervention, which has been shown in the literature to improve hip and knee joint Secondly both studies measured the immediate postintervention outcomes with only Markovic performing a second ROM assessment 24hours later which showed that the IASTM group maintained more joint ROM/3 It is important to note that Markovic performed the comprehensive warmup prior to the 24hour follow up which may have influenced the favorable outcomes found. Perhaps, a longer postintervention assessment period using preestablished time points and more stringent guidelines may have helped to better determined the lasting effect IASTM TOOL should be used on 45degree angle to the targeted tissue no matter what treatment edge practitioner decides to used .The treatment edges were designed to optimally affect when used at there commended 45degree angle.

PROCEDURE

Prior to the commencement of the study, this study was approved by the institutional ethical committee at TMV College of Physiotherapy at Pune. For this study all he students , patient interns from TMV College of Physiotherapy where the participant will be screened according to inclusion and exclusion criteria participant were explained regarding the procedure prior study.60 subject both male and female, in age 20 to 50 years were include. Subject were randomly assigned to two group Experimental group and Control group. Experimental group along with IASTM with MFR and Control group with MFR. Two outcome measures were used Numerical pain rating scale and Range of motion. The interventional study was conducted for 3weeks. The result of both the groups were compared after 3 weeks. STATISTICAL

ANALYSIS AND INTERPRETATION

The obtained data were calculated using SPSS. The relative value for each individuals subject before and the after experimental protocol and control protocol was compared using paired T test. After that, the un paired T test was used to compared the relative changes between the two group . Statistical significance was accepted the values of P0.05

The data derived from both groups at the end of weeks were compared statistically using paired sample T test. The change between the pre and post readings of every individual for NPRS score, ankle ROM and NPRS was done

using paired ttest. A total number of 60 participants was divided into two groups, one is experimental group and the other is control group to compare the effectiveness of TASTM on gastrocnemius tightness. In the experimental group (IASTM with MFR) were given for 4 weeks and control group (MFR) given for 4 weeks. The participants were assessed by NPRS, Ankle ROM and NPRS before intervention and reassessed after 4 weeks. Following were the result obtained. The t value of experimental group is 20.650 and p value is 0.0001 and in control group the t value is 18.676 and p value is
0.005. Treatment was administered to Group A (Experimental group n30) along with Group B (Control n30) MIF only. The NPRS and ROM of ankle were used outcome measure. A total number of 60 patient were included in the study. All patients were suffering from mechanical calf pain and age between 2050 years of age which could be moving to the high levels of activity undertaken by people of this age group. The analysis shows that experimental group and control group. Each group were having 30 participants in experimental group pre and post data of ROM and PAIN has been taken. In control group pre and post data of ROM and PAIN has been taken. In experimental group pain P value is 0.0001 which is extremely significant and ROM of experimental group P value is 0.0001 which is also extremely significant. In control group pain P value is 0.00001 which is extremely significant and ROM of control group P value is 0.1501 which is not significant. Hence IASTM MFR are more effective in comparison with only MFR which was given in control group of ROM, which does not shown significant result. A Similar study was conducted by Nicole MacDonald, Russell Baker et al. in the year 2016 on The Effects Of Instrument Assisted Soft Tissue Mobilization On Lower Extremity Muscle Performance: A Randomized Controlled Trial. The study's objective was to determine whether standard therapy application had an impact on muscle performance metrics by examining the effects of IASTM on muscle performance. The study's methodology involved randomly assigning a convenience sample of 48 physically active adults to one of three groups: the control group, the triceps surae treatment group, or the gastrocnemius treatment group. Prior to doing three countermovement vertical jumps (CM.J.), participants warmed up for five minutes on a Monark bicycle ergometer. Following this, one researcher applied the IASTM therapy for three minutes to each leg at the designated location (such as the gastrocnemius) for the treatment groups, while the control group rested for six minutes. Three more CMIs were taken by individuals just after therapy. Measures were included both before and after testing Measures of vertical jump Heier 0f1, peak power (PP), and peak velocity (PV) were included in the pre and post testing. The study came to the conclusion that neither the pre-test trials nor the post-test trials showed any statistically significant differences between treatment groups in JH, P, or PY.

According to the study, healthy individuals' muscle performance does not immediately improve with the typical IASTM treatment duration. In this study of comparison, the immediate effects of IASTM & MFR in Gastrocnemius tightness showed significant improvement in increase in the Range of Motion (ROM) of ankle joint and decrease in the pain of gastrocnemius tightness & release in tightness of the muscle. IASTM is a tool which is used in remodeling of scar tissue and breaking down adhesion, it is simple and particle technique. The changes reduced tissue elasticity and cause adhesion, This may result in pain and reduced soft tissue function. Removing scar tissues and encouraging a return to normal function after soft tissue regeneration is the main objective of IASTM (Gehlens et al., 1999; Melham et al., 1998).However, according to some research, IASTM works by inducing localized inflammation in the soft tissue, which restarts the healing process (Hammer, 2008). As a result, TASTM is a technique that has been shown to increase joint range of motion and decrease discomfort by using an instrument to remove scar tissue that has developed in soft tissue, Myofascial release refers to manual technique for stretching the fascia and releasing bonds between fascia and muscles and bones with the goal of eliminating pain, increasing range of motion and balanced the body MFR seeks to unlock the tension in the fascia It helps to soften and lengthen the fascia by breaking down the adhesion MFR is the pain associated with inflammation or irritation of muscle or the fascia surrounding muscle Hanten and Chandler 1994 studied and found that, MFR is effective in releasing tightness and reduced pain. The literature regarding the effectiveness of MER was mixed in both quality and results.The studies in the reviews may serve as a good foundation for future trials MFR should be compared with a control group and experimental group and with other established treatment. As many studies were conducted similar to this study IASTMMFR found to be a tool and technique to decrease pain and increase range of motion of the joints. This technique can be used in clinical practice. Thus more studies can be done on a large population for a longer period.

CONCLUSION

The study concluded that IASTMMFR is more effective than only MFR in reducing pain, releasing tightness, increasing ankle range of motion after week of treatment session Therefore, his study could be the option for treatment planning and can be used as a new approach for treatment

LIMITATION OF STUDY

The study was conducted on small sample size.

2.The intervention was done only for 4 weeks.

3.Not many studies have been done on IASTM Tool

FUTURE SCOPE OF THE STUDY

1. The study can be conducted on bilateral gastrocnemius muscle tightness

2.The study can be conducted on larger sample size.

3.The study can be conducted on IASM Tool for other group of muscle along with different intervention

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