A STUDY ON THE EFFECTIVENESS OF INSTRUMENT ASSISTED SOFT TISSUE MOBILIZATION IN REDUCING PAIN AND INCREASE RANGE OF MOTION IN PATIENTS WITH PATELLOFEMORAL PAIN SYNDROME

A dissertation submitted in partial fulfillment of the requirement for the degree of

MASTEROF PHYSIOTHERAPY

(ELECTIVE - PHYSIOTHERAPY IN SPORTS)

Submitted

To

The Tamil Nadu Dr. M.G.R. Medical University

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By

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INTERNAL EXAMINER

EXTERNAL EXAMINER

A dissertation submitted in the partial fulfillment of the requirement for the degree of **Master of Physiotherapy- May 2019** to The Tamilnadu Dr. MGR Medical University, Chennai.

CERTIFICATE

Certified that this is Bonafide work of Miss. Daisy. A of R.V.S. College of Physiotherapy, Sulur, Coimbatore submitted in partial fulfillment of requirements for Master of Physiotherapy Degree course from the Tamilnadu Dr. M.G.R Medical University under the Registration No. 271750022

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DAISY. A

DECLARATION

I hereby declare and present my project work entitled**"A STUDY ON THE EFFECTIVENESS OF INSTRUMENT ASSISTED SOFT TISSUE MOBILIZATION IN REDUCING PAIN AND INCREASE RANGE OF MOTION IN PATIENTS WITH PATELLOFEMORAL PAIN SYNDROME"**The outcome of the original research work undertaken and carried out by me under the guidance of **Dr. B. Kannabiran, MPT., Ph.D.**Professor, R.V.S College of Physiotherapy, Sulur, Coimbatore, Tamil Nadu.

I also declare that the material of this project has not formed in anyway the basis for the award of any other degree previously from the Tamil Nadu Dr. M.G.R Medical University, Chennai.

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Introduction

INTRODUCTION

Anterior knee pain as (often called “patellofemoral pain”) can be defined changes in patellofemoral joint. It is caused due to abnormal force, increased pull of the lateral quadriceps retinaculam with acute or chronic lateral patellofemoral subluxation or dislocation or prolonged repetitive compression or shearing force on the patellofemoral joint. It is more common in people who are overweight, dislocation, fracture or other injury to the knee cap, football players, runners, jumpers, skiers, teenagers **(Noyes *et al.,* 2012)**

Patellofemoral pain syndrome is described as anterior knee pain, because it causes aberrant motion of patella in the trochlear groove, which results from biochemical or physical changes within the patellofemoral joint.

Patient often complains of a dull ache in the anterior aspect of the knee that may be accentuated by movie sign. Pain in the back of the knee, particularly the hamstring origin or in the mid belly of the posterior thigh is also common. The complaints may be gradual at first, become accentuated if the early symptoms are ignored. Crepitus, knee effusion, and give way are uncommon findings in pure overuse syndrome. Tightness in the hamstring and quadriceps can concentrate stress on the patellofemoral joint and surrounding tissues during vigorous activity. Prolonged stress may lead to soft tissue breakdown, particularly in the patellar tendon **(Fulkerson *et al.,* 1982)**

The patella is the flat triangular shaped and it is the largest sesamoid bone in the body. It is an inverted triangle with in the apex directed inferiorly and posterior surface is divided by a vertical ridge and converted by articular cartilage. Its function

primarily as an anatomical pulley for the quadriceps muscle. The movement of the patella are patellar flexion, patellar extension and patellar tilt **(Levangie *et al.,*2004)**

Wiberg attempted to classify patellae according to the shape of articular facts: Type 1 patellae have equal sized concave facets; Type 2 and 3 have larger lateral facet, with the former associated with a concave medial articular surface and the profile to type 3 being more convex **(Sandow 1985)**

Patella Alta or high-riding patella, may be associated with subluxation, possibly due to the pull of vastus lateralis producing a lateral shift of patella before It is firmly seated in the femoral groove. The evidence for a relation to retropatellar Chondromalacia is much more tenuous **(Insall 1971).**

Excessive lateral patellar tilt may cause progressive pain and disability in the Athletes. The athlete may complain of pain in the anterior aspect of the knee, which, when further investigated, is really located either in the lateral retinaculam, the Vastus Medialis and oblique or both. Early in the course of this syndrome, the pain often Persists for only a few hours and activities, later the symptoms, may persist for 2 or more days after athletics exertion and may be constant daily activities such as stair Climbing and even walking on level ground may be affected. On physical exam the patella often appears laterally tilted. The lateral retinaculum is tight and be tender. Attempts to correct the patellar tilt, with downward pressure on the medial aspect of the patella may precipitate pain. Pain may be further aggravated by force flexion of the knee. The vastus medialis oblique insertion on the patella may be tender from overuse. **(Fulkerson *et al*., 1982).**

The clinical features of patellofemoral pain syndrome are effusion, Tenderness, Crepitus, pain grating or grinding sensation when knee is flexed **(Crossley *et al*.,2002)**.

The patellofemoral joint comprises the patella and the femoral trochlea. The patella act as a lever and also increase the quadriceps and patellar tendon contact of patella with the femur is initiated at 20 degree of flexion and increase the further knee flexion reaching a maximum degree at 90. Stability of the patellofemoral joint involve the dynamic and static stabilizer which control movement of the patella within the trochlea referred to as patella tracking can be altered by imbalance in these stabilizing forces affecting the distribution of force along the patellofemoral articular surface, the patella and quadriceps tendon and the adjacent soft tissues. Force on the patella range from between one third and one half of person body weight during **(Levengle *et al*., 2004)**.

Patellofemoral pain syndrome is caused due to the overuse and overload and also due to the biomechanical and muscular dystrophy. It is diagnosed with the manual compression of kneecap with quadriceps muscle is tightened, it is referred as positive sign “shrug sign”. Overuse, trauma, muscle dysfunction, tight lateral restraints, hypermobility and poor quadriceps flexibility are the risk factor. **(Fulkerson *et al*., 1996)**. Investigatory procedures include, X ray anterio-posterior and lateral view of the knee and magnetic resonance imaging (MRI) is used to see the if pain is due to bones, cartilage, and muscle problem.

Instrument Assisted Soft Tissue Mobilization or Simply IASTM is a new range of tool which enables clinicians to efficiently locate and treat individuals diagnosed with soft tissue dysfunction. IASTM is performed with ergonomically

designed instruments that detect and treat fascial restrictions, encourage rapid localization and effectively treat areas exhibiting soft tissue fibrosis, chronic inflammation, or degeneration. As in any Manual therapy treatment ,supplementation with exercises and additional modalities e.g. joint mobilization designed to correct biomechanical deficiencies by addressing musculoskeletal strength and muscle imbalances throughout the entire kinetic chain should be used in conjunction with IASTM **(GuaSha 2018).**

1.1 Statement of the study

A study on the effectiveness of instrument assisted soft tissue mobilization (IASTM) for patellofemoral pain syndrome (PFPS).

1.2 Objectives of the study

To find out the effectiveness of IASTM in reducing pain for patellofemoral pain syndrome.

To find out the effectiveness of IASTM in improving knee flexion range of motion for patellofemoral pain syndrome.

1.3 Need of study

The need for the study is to popularize and also create awareness among physiotherapist and patients that instrument assisted soft tissue mobilization can be used to reduce pain and increasing knee flexion range of motion in patellofemoral pain syndrome.

1.4 Hypothesis

1. It may be hypothesized that there may be a significant difference in pain and knee flexion range of motion following instrument assisted soft tissue mobilization.
2. It may be hypothesized that there may not be a significant difference in pain and knee flexion range of motion following instrument assisted soft tissue mobilization.

1.5 Operational definitions

Pain

It is an unpleasent sensory and emotional experience associated with acute or potential tissue damage **(Chanmugam 2001).**

Patellofemoral pain syndrome

Anterior knee pain as (often called "patellofemoral pain") can be defined changes in patellofemoral joint. It is caused due to abnormal force, increased pull of the lateral quadriceps retinaculam with acute or chronic lateral patellofemoral subluxation or dislocation or prolonged repetitive compression or shearing force on the patellofemoral joint. **(Noyes 2012)**

Instrument Assisted Soft Tissue Mobilization (IASTM)

Instrument assisted soft tissue mobilization (IASTM) is a new range of tools that enables clinicians to efficiently locate and treat individuals diagnosed with soft tissue dysfunction. IASTM is performed with ergonomically designed instruments that detect and treat fascial restrictions, encourage rapid localization and effectively treat areas exhibiting soft tissue fibrosis, chronic inflammation, or degeneration **(GuaSha 2018).**

Review of Literature

CHAPTER II

REVIEW OF LITERATURE

Section A: Studies related to reliability and validity of visual analogue scale in measurement of pain.

Section B: Studies related to reliability, validity of goniometer in measurement of knee flexion range of motion.

Section C: Studies related to instrument assisted soft tissue mobilization (IASTM) for patellofemoral pain.

Section D: Studies related to patellofemoral pain syndrome.

Section A: Studies related to relia bility and validity of visual analogue scale in measurement of pain.

Katharine *et al.,* (2018) conducted a study on 6713 abstracts were review; 186 full-text references included. There was a lack of consensus in the literature on the justification for response scale type based on the reliability, validity, and responsiveness of a patient reported outcome instrument. The visual analogue scale, numerical rating scale and verbal rating scale are acceptable response scale types in the development of patient reported outcome instrument.

Silver *et al.,* (2008) conducted a study on 90 subjects in the reliability on visual analog scale for measurement of acute pain concluded that VAS is generally regarded as valid and reliable tool for chronic pain measurement. Although it appears to be

equally valid in acute pain measurement and concluded VAS by a highly reliable instrument of acute pain.

Bijur *et al.,* (2008) conducted a study on patellofemoral pain, for adults with acute pain. Reliability of VAS for acute pain measurement was assessed by the interclass correlation and appears to be high. 90% of pain rating were reproducible within 9mm. Hence the study concluded that VAS was a sufficiently reliable scale to assess acute pain.

McCormack *et al.,* (2005) speculated VAS as a valid and reliable tool in clinical applications. The study concluded that VAS is a simple technique for measuring subjective experience.

Heather *et al.,* (1998) visual analogue scale (VAS) provide a simple technique for measuring subjective experience. They have been established as valid and reliable in a range of clinical and research applications, although there is also evidence of increased error and decreased sensitivity when used some subject groups. Decision concerned with the choice of scoring interval, experimental design, and statistical analysis for VAS have in some instances been based on convention, assumption and convenience, highlighting the need for more comprehensive assessment of individual scales if this versatile and sensitive measurement technique is to be used to full advantage.

Section B: studies related to reliability, validity of goniometer in measurement of knee flexion range of motion.

Melanie *et al.,* (2018) mentioned in their study that the objective measurements of joint ROM as a part of physical therapist's daily work. ADL and exercise can be complicated when the ROM is limited and depending on the demands in daily living, the knee joint requires different ROM. In sports, a few degrees in ROM may make the difference between getting injured or not. The goals for physical therapist are to help the patients to regain full ROM, mobility, strength, and functions after sustaining an injury.

Nammond yaikwawongs *et al*.,(2009) mentioned in their reliability of range of motion measurement in the knee joint using a goniometer combined with inclinometer with standard range of motion measurement. Range of flexion and extension of the knee joint in volunteer participants was measured by the goniometric tool. The results were compared with knee joint motion with standard range of motion measurement. Range of motion of knee joint measured by goniometer very well with the data obtained standard measurement. The intraclass correlation coefficient equals 0.973. Goniometer was a reliable tool to measure knee joint range of motion in flexion and extension plane.

Richard *et al., (*1988) mentioned in their study that the clinical measurement of range of motion is a fundamental evaluation procedure with the ubiquitous application in physical therapy. Objective measurement of ROM and correct interpretation of the measurement results can have a substantial impact on the development of the scientific bases of therapeutic intervention. The purpose of this article is to review the related literature on the reliability and validity of goniometric measurements of the

extremities. Special emphasis is placed on how the reliability of goniometry is influenced by instrumentation and procedures. Our discussion of validity encourages objective interpretation of the meaning of ROM measurements in light of the purposes and the limitation of the goniometry.

Section C: Studies related to effectiveness of instrument assisted soft tissue mobilization (IASTM)

Mathew lambert *et al.*,(2017) conducted a systemic study to examine the evidence of effectiveness of IASTM compared other interventions on patients with pain and knee function resulting from musculoskeletal impairments. The studies involved treatment of numeri's anatomical location and the majority of studies demonstrated significant improvement in pain and or range of an effective treatment in intervention for decrease pain and improve range of motion.

Cheatham *et al.*, (2016) conducted a study of the efficiency of IASTM for myofascial restriction. The purpose of this study was to systemically appraise the current evidence assessing the effects of IASTM as an intervention to treat musculoskeletal pathology or to enhance joint range of motion. Results show that a studies were insignificant with both groups displaying equal outcomes. The study concluded that the efficiency of IASTM as a treatment for common musculoskeletal pathology.

Carey loghmani *et al.*,(2010) conducted a randomized clinical trial refer to a technique that uses an instrument to remove scar tissue that had formed in soft tissues and assists in the healing process by activating fibroblasts. IASTM is simple and

practical and requires only a short period of time for a single treatment. According to previous studies, IASTM was found to improve soft tissue function and range of motion in acute or chronic injuries to soft tissues, while also reduce pain. However, most of the studies that supported the hypothesis concerning the mechanism and effects of IASTM. Finally, to date, most of the studies concerning IASTM have focused on injuries to tendons, rather than to muscles or ligaments.

Cherkin *et al.,* (2001) conducted a randomized clinical trial to find out the effectiveness of acupuncture, the therapeutic massage and self-care education for patellofemoral pain syndrome. 262 patients age 20-70 years who had patellofemoral pain syndrome received acupuncture, therapeutic massage and self-care education. After 10 weeks massage was superior to self-care on symptom scale. They concluded therapeutic massage effective for patellofemoral pain, provide benefits.

Section D: Studies related to patellofemoral pain syndrome

Arazpour *et al.,* (2016) conducted a study was related to patellofemoral pain syndrome(PFPS) is one the most frequent causes of anterior knee pain in adolescents and adults. This disorder can hav a big effect on patients' ability and quality of life and gait. This review included all articles published during 1990 to 2016. An extensive literature search was performed in databases of science direct, google scholar, PubMed and ISI Web of Knowledge using OR, AND, NOT between the selected keywords. Finally, 16 articles were selected from final evaluation. In PFPS subjects, there was lower gait velocity, decreased cadance, and reduced knee extensor moment in the loading response and terminal stance, delayed peak rear foot eversion during gait and greater hip adduction compared to healthy subjects, while for hip

rotation, there was controversy in studies. Changes in the walking patterns of PFPS subjects may be associated with the strategy used for the reduction of patellofemoral joint reaction force and pain.

Pablo *et al.,*(2015) conducted a study was analyze the effectiveness of treatment of patellofemoral pain syndrome with physical exercise. The findings of ten clinical trials of moderate to high quality were evaluated to determine the effectiveness of physical exercise as management for PFPS. The intervention programs that were most effective in relieving pain and improving function in patellofemoral pain syndrome included strengthening exercises for the hip external rotators and abductor muscles and knee extensor.

Petersen *et al.,*(2013) conducted a study was related to patellofemoral pain syndrome is a possible cause for anterior knee pain, which predominantly affects young female patients without any structural changes such as increased Q-angle or significant chondral damage. This literature review has shown that PFPS development is probably multifactorial with various functional disorders of the lower extremity. biomechanical studies described patellar maltracking and dynamic valgus in PFPS patients (functional malalignment). PFPS is further associated with vastus lateralis/vastus medialis dysbalance, hamstring tightness or illiotibial tract tightness. The literature provides evidence for a multimodal non-operative therapy concept with short term use of NSAIDs, short-term use of a medially directed tape and exercise programmes with the inclusion of the lower extremity, and hip and trunck muscles. Patients with anterior knee pain have to be examined carefully with regard to functional causes for a PFPS. The treatment of PFPS patients is non operative and address the functional causes. Level of evidence V.

Lori *et al.*, (2010) study was conducted a general quadriceps strengthening continues to reduce pain in patients with patellofemoral pain syndrome. Current evidence supports the continued use of knee strengthening exercise for management of patellofemoral pain syndrome. The purpose of this systemic review was to provide an update on the evidence for the management of patellofemoral pain syndrome. Quadriceps exercise continues to represent an important treatment strategy. The results of this systemic review also support the addition of hip strengthening exercise.

Methodology

CHAPTER III

METHODOLOGY

3.1 Study setting

The study was conducted in outpatient department RVS College of physiotherapy,

Sulur, Coimbatore.

3.2 Selection of subjects

20 patients who fulfilled the inclusion and exclusion criteria were randomly selected.

Experimental group: Instrument assisted soft tissue mobilization (IASTM)

3.3 selection of Variable

3.3.1 Dependent variables

- Pain
- Restricted ROM

3.3.2 Independent variables

- Instrument assisted soft tissue mobilization (IASTM)

3.4 Measurement tools

VARIABLES	TOOLS
Pain	Visual Analogue Scale (VAS)
Range of motion	Goniometer

3.5 Study design

Pre and post-test experimental design

3.6 Duration of study

Duration of the study was 3session for 3weeks.

3.7 Inclusion criteria

- Both males and females were included.
- Symptoms for atleast 3months
- The subjects were between 25 to 50 years of age.
- Patellofemoral pain syndrome patients were only included.

3.8 Exclusion criteria

- Trauma
- Sports injury
- Infection
- Reduced muscular endurance
- Any neurological disease

3.9 Orientation to the subject

Before the collection of data all the subjects were explained about the purpose of the study. The concern and full co-operation of each participant was sought after complete explanation of the condition and demonstration of the procedure involved this study.

3.10 Materials used

- IASTM tool
- Moisturizing lotion
- Couch
- Pillow
- Towel
- Paper tissue

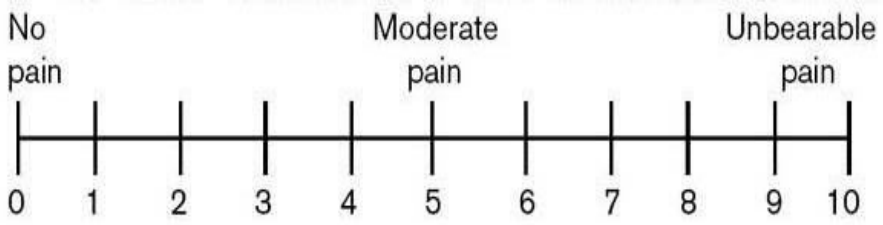
3.11 Test of administration

The study were tested with goniometer and visual analogue scale to estimate their pain and increase knee flexion ROM of the subjects.

Visual Analogue Scale

It was used for the measurement of pain. It assessed the pain severity by asking the subjects to indicate the present level of pain. Equipment required; A strip of paper on which there was a horizontal line of 10 cm length. The numbers 0 to 10 were marked on the line with 1cm width between each number. 0 was on one end of the line and 10 was on the other end of the line.

The numbers represented by the degree of pain intensity, 0 indicated no pain and 10 indicated worst pain. The patient was asked to mark the number in the line at the point corresponding to the intensity of pain at that very moment.



Goniometer

A goniometer is an instrument that either measures an angle or allow an object to be rotated to a precise angular position. The term goniometry is derived from two greek words, gonio, meaning angle, and metron meaning measure.

3.12 Treatment procedure

20 patients were randomly selected between the age group of 25 to 50 years. All subjects underwent a pre - test assessment and post - test assessment of patellofemoral pain using VAS scale. And pre - test assessment and post - test assessment for knee flexion range of motion using goniometer. These assessments where taken before and after interventions.

EXPERIMENTAL GROUP

Instrument assisted soft tissue mobilization (IASTM)

Patient position: Side lying with hip and knee extended

Therapist position: Walk standing position behind the side of the patient.

Treatment procedure:

The treatment technique starts with a good warm up which prepares the densified area for treatment. This also helps by decreasing sensitivity in the affected area.

In the lateral thigh and the illiotibial band area there are three main areas; The gluteus maximus/ITB junction, The mid portion of the illiotibial band along the length, and the area between the hamstring and illiotibial band in the distal portion of the illiotibial band.

Always apply lubricant to the skin to enable the tool to slide on the skin and cause minimal irritation.

Make sure the skin is not broken and that there are no obvious protrusions on the skin. i.e. moles

A stainless steel tool is then placed on the lateral part of thigh region. The tool is designed in a way so that is able to flawlessly follow the length of the muscles and tissue that may have been affected by the injury.

The tool is placed in 45 degree at the edge of the skin. Start scanning superficially with the sharper side of the tool.

Start to treat with dull side proximal to distal directions and is slowly slide on over the lateral part of thigh. When it passes over the densification can occur in any part of the body and may build up after an injury.

Start with light pressure and slow strokes in one direction that is applied to the skin surface increases as the therapist continues the procedure. The tool enables the therapist to detect the densified areas as they are not especially trained to detect areas of densified tissue. The repeated rubbing on the affected area (the lateral aspect of thigh region) is what causes relief, the greatest changes occur in two minutes of treatment.

Figure 1: shows Instrument Assisted Soft Tissue Mobilization for Iliotibial band.

3.13 Collection of data

The selected 20 patellofemoral pain syndrome subjects were taken.

Instrument assisted soft tissue mobilization (IASTM)

Experimental group were given treatment for 3 sessions for 3 weeks. Before and after the completion 3session of 3weeks treatment intervention, pain was evaluated by VAS and knee flexion ROM was measured by Goniometer.

3.14 Statistical techniques

The collected data were analyzed by paired “t” test to find out significance difference between pre and post-test values of experimental group.

Data Analysis & Result

CHAPTER IV

DATA ANALYSIS AND RESULTS

4.1. Data analysis

This chapter deals with the systemic presentation of the analyzed data followed by the interpretation of the data.

a) Paired 't' test

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

$$s = \sqrt{\frac{\sum d^2 - \frac{(\sum d)^2}{n}}{n-1}}$$

$$t = \frac{\bar{d}\sqrt{n}}{s}$$

Where,

d - Difference between pre-test and post-test values

$\bar{d} = \frac{\sum d}{n}$ Mean difference between pre test and post test values

n - Total no. of subjects

S-Standard deviation

Table 1

Mean value, Mean difference, Standard deviation and paired 't' value between pre and post test scores for pain.

Measurement	Mean	Mean Difference	Standard Deviation	Paired 't' value
Pre-test post test	5.1 3.0	2.1	0.58	16.5

*0.005 level of significance

The calculated paired 't' value for pain is 16.5 and the table 't' value is 3.250 at 0.005 level of significance. Hence, the calculated 't' value is greater than the table 't' value, there is significant difference in pain following among patellofemoral pain syndrome patients.

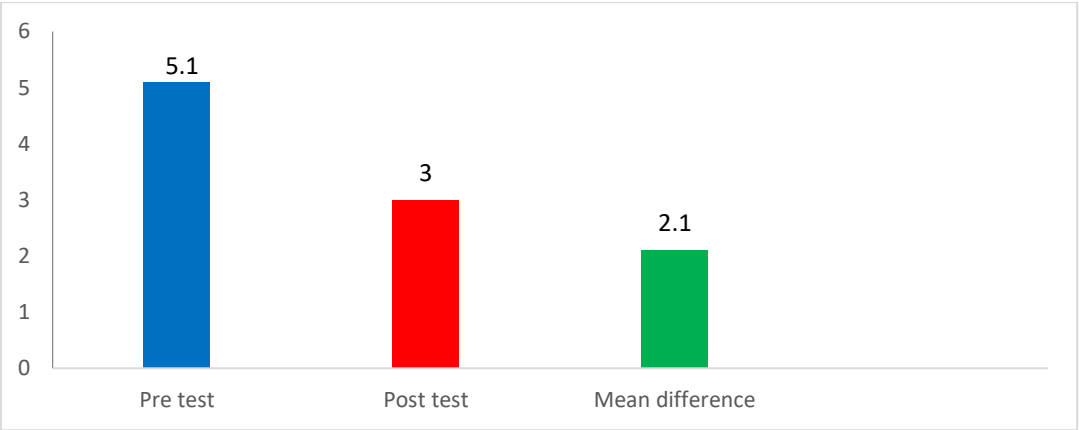


Figure 2: Graphical representation of the pre mean, post-test mean values and mean difference values of pain.

Table 2

Mean value, Mean difference, Standard deviation and paired 't' value between pre and post test scores for knee flexion range of motion

Measurement	Mean	Mean Difference	Standard Deviation	Paired 't' value
Pre-test	126.9	8.8	1.7	5.18*
Post-test	135.7			

*0.005 level of significance

The Calculated Paired 't value for knee flexion range of motion is 5.18 and the table 't' value is 3.250 at 0.005 level of significance. Hence, the calculated 't' value is greater than the table 't' value there is significant difference in knee flexion range of motion following among patellofemoral pain syndrome patients.

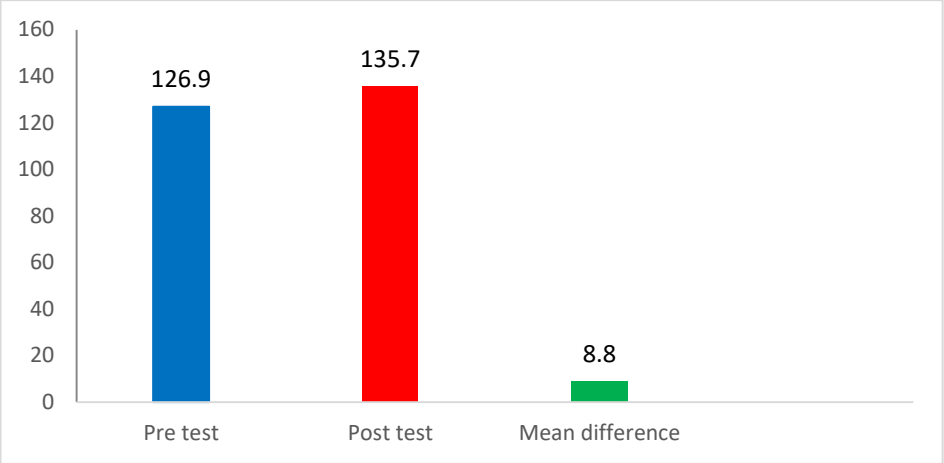


Figure 3: Graphical representation of the pre mean and post-test mean values of knee flexion range of motion.

4.2. Results

Twenty PFPS patients were selected for this study. patients were received instrument assisted soft tissue mobilization for a period of 3 sessions for 3 weeks before and after intervention pain and knee flexion range of motion were assessed by VAS and Goniometric tool.

Analysis of Dependent Variable pain in the Experiment:

The calculated paired ‘t’ value for pain is 16.5 and the table ‘t’ value is 3.250 at 0.005 level of significance. Hence, the calculated ‘t’ value is greater than the table ‘t’ value there is significant difference in pain following instrument assisted soft tissue mobilization among patellofemoral pain syndrome patients.

Analysis of Dependent Variable knee flexion range of motion in the Experiment:

The calculated paired ‘t’ value for knee flexion range of motion is 5.1 and the table ‘t’ value is 3.250 at 0.005 level of significance. Hence, the calculated ‘t’ value is greater than the table ‘t’ value there is significant difference in knee flexion range of motion following instrument assisted soft tissue mobilization among patellofemoral pain syndrome patients.

Discussion

CHAPTER V

DISCUSSION

Patellofemoral pain syndrome (PFPS) is generally described as anterior knee pain around or behind the patella aggravated by increased activity, particularly flexion, and excessive use of the quadriceps muscle. So many treatment techniques have been used to relieve the symptoms of patellofemoral pain syndrome.

The aim of the study is to find out the effectiveness of instrument assisted soft tissue mobilization to reducing pain and improve knee flexion range of motion in PFPS patients. 20 subjects were selected for the study and the patients were received instrument assisted soft tissue mobilization.

As the technique has evolved and we learn more and more about the possible mechanisms of this approach. It becomes quite apparent that in practice, the response from the technique occurs within a small time frame of 2-5 minutes depending on the size of the area. One of the most apparent effects of IASTM, is erythema and indeed an increase in superficial circulation has been found in Gua Sha.

Results of the present study shows that there is a significant difference in pain and knee flexion range of motion following instrument assisted soft tissue mobilization in patients with patellofemoral pain syndrome.

(GuaSha 2018), Instrument assisted soft tissue mobilization (IASTM) is a new range of tools that enables clinicians to efficiently locate and treat individuals diagnosed with soft tissue dysfunction. IASTM is performed with ergonomically designed instruments that detect and treat fascial restrictions,

encourage rapid localization and effectively treat areas exhibiting soft tissue fibrosis, chronic inflammation, or degeneration.

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Hence, hypothesis 1 is accepted, hypothesis 2 is rejected.

Conclusion

CHAPTER VI

CONCLUSION

This study was conducted to evaluate the effectiveness of instrumented assisted soft tissue mobilization in reducing pain and improve knee flexion range of motion among PFPS patients. Subjects were selected for the study and were given IASTM for a period of 3 sessions for 3 weeks. Pain and knee flexion range of motion were assessed before and after the study using Visual analogue scale and Goniometer respectively.

From the statistical results it can be concluded that instrument assisted soft tissue mobilization is effective in reducing pain and improve knee flexion range of motion among patients with patellofemoral pain syndrome.

6.1 Limitations

- The study group was small in size
- The study was limited to age group
- The study did not include follow-up

6.2 Suggestions

- The study can be done with more number of patients
- The study can be conducted for other age groups
- The study can be compared with other treatment like exercises, taping etc.

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CHAPTER VII

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Annexure

ANNEXURES

ANNEXURE-I

PHYSIOTHERAPY ASSESSMENT CHART

Subjective examination

Name :

Age :

Address :

Occupation :

Chief complaints :

Medical history :

Associated problems :

Pain assessment

Onset :

Side :

Site :

Duration :

Nature :

Aggravating factor :

Relieving factor :

Other if any :

Objective examination

On observation

Built :

Posture :

Attitude of limbs :

Muscle wasting :

Skin changes :

Bony and soft tissue contour :

Edema :

Gait :

Deformity :

On palpation

Tenderness :

Swelling :

Muscle spasm :

Warmth :

Other if any :

On examination

Vital signs :

Motor Assessment :

Range Of Motion for knee :

Movement	AROM	PROM
Flexion		
Extension		

Muscle strength

Investigations

Differential Diagnosis

Provisional Diagnosis

Special tests

- Clarke's test
- McConnell test for Patellofemoral pain syndrome

ANNEXURE-II

Table 3: Pre and Post test values of Visual analogue Scale for patients

SL NO.	PRE TEST	POST TEST
1	4	2
2	3	1
3	5	4
4	7	4
5	6	3
6	4	2
7	5	3
8	3	1
9	6	4
10	4	2
11	7	4
12	5	4
13	4	3
14	6	4
15	8	5
16	5	2
17	7	5
18	4	2
19	6	4
20	4	1

Table 4: Pre and Post test values of goniometric measurement`for knee flexion

SL NO.	PRE TEST	POST TEST
1	125	130
2	128	132
3	122	135
4	130	134
5	132	139
6	138	142
7	140	143
8	131	145
9	125	140
10	128	136
11	120	138
12	137	141
13	123	134
14	127	140
15	126	126
16	118	132
17	124	129
18	110	130
19	127	127
20	128	140

ANNEXURE III

Special Tests

- **Clarke's test**

  Patient position- Side lying.

  Therapist position- Standing by the side of the patient.

  Procedure- The examiner places the web space of hand just superior to the patella while applying pressure. The patient is instructed to gently and gradually contract the quadriceps muscle.

  Implication- The positive sign on this test indicates pain on the patellofemoral joint.

- **McConnell test for Patellofemoral pain syndrome**

  Patient position- High sitting with leg laterally rotated.

  Therapist position- Standing by the side of the patient.

  Procedure- Isometric Quadriceps contractions are performed at 0,30,60,90 and 120 degrees of knee flexion for 10 seconds. If pain is produced with any of this movement, repeat test with patella pushed medially.

  Implications- The sign of this test is decrease in symptoms with medial glide.

ANNEXURE-IV

PATIENT CONSENT FORM

I……. Voluntarily consent to participate in the research named on **"A STUDY ON THE EFFECTIVENESS OF INSTRUMENT ASSISTED SOFT TISSUE MOBILIZATION IN REDUCING PAIN AND INCREASING RANGE OF MOTION AMONG PATELLOFEMORAL PAIN SYNDROME PATIENTS."**

The researcher has explained me the treatment approach in brief, risk of participation and has answered the questions related to the study to my satisfaction.

Signature of Patient **Signature of Researcher**

Signature of Witness

Place:

Date: