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**Preeti Phullaya**
Intern, P.E.S Modern College of Physiotherapy, Shivaji Nagar, Pune, Maharashtra, India

**Dr. Sanket Nagrale**
Associate Professor, P.E.S Modern College of Physiotherapy, Shivaji Nagar, Pune, Maharashtra, India

**Dr. Sucheta Golhar**
Principal, P.E.S Modern College of Physiotherapy, Shivaji Nagar, Pune, Maharashtra, India

**Corresponding Author:**
**Preeti Phullaya**
Intern, P.E.S Modern College of Physiotherapy, Shivaji Nagar, Pune, Maharashtra, India

# Effect of myofascial release on pain and hamstring tightness in individuals with knee osteoarthritis: An experimental study

**Preeti Phullaya, Dr. Sanket Nagrale and Dr. Sucheta Golhar**

**Abstract**
**Objective:** This study was undertaken to see the effect of Myofascial Release Technique on pain, hamstring tightness and functional disability in individuals with knee osteoarthritis.
**Background:** Osteoarthritis is degenerative joint condition. The primary symptoms of knee osteoarthritis are joint pain, stiffness, limitation and movement. The prevalence of knee osteoarthritis in India is 28.7%. Where the conventional treatment mostly emphasize on pain reduction and muscle strengthening and very less on muscle stretching. Hamstring muscle stretching plays an important role in relieving pain and improving functional disability in O.A knee patients. Myofascial release is of the technique to improve muscle flexibility which is here used over hamstring muscles with conventional treatment.
**Outcome Measures:** Visual Analogue Scale (VAS), Active Knee extension Test (AKT), Knee Injury and Osteoarthritis Outcome Score (KOOS)
**Method:** The study included 30 subjects having O.A. knee with hamstring tightness with 15 subjects in each group. Group A received Myofascial Release Technique (MFR) for hamstring tightness with conventional treatment and Group B received only conventional treatment for 6 days over a period of 1 week.
**Result:** The finding of this study revealed significant difference in pain (VAS) in group A as compared to group B with the mean values of 3.74(Group A) and 2.26(Group B) (t value =7.036,p value=<0.0001)
The finding of this study revealed significant difference in improvement in hamstring flexibility (AKT) in group A compared to group B with the mean values of 20(group A) and 6.4(group B) (t value =10.30, p value= <0.0001)
The finding of this study revealed significant difference and improvement in functional disability in group A as compared to group B with mean value of 33.54 and 22.47 respectively (t value=4.755, p value = <0.0001)
**Conclusion:** The study showed significant reduction in pain and improvement in functional disability in both the groups. Inter group comparison showed Group A which consisted MFR for hamstring tightness with conventional is more effective than only conventional treatment to reduce pain, improve hamstring flexibility and functional disability.

**Keywords:** O.A., MFR, KOOS, pain, disability, tightness

## 1. Introduction
Osteoarthritis is degenerative joint disease which involves the cartilage and many of its surrounding tissue. There is osteophyte formation remodelling of subarticular bone, ligamentous laxity, synovial inflammation weakening of periarticular muscles these changes may occur as a result of an imbalance in the equilibrium between the break down and repair of joint tissue [2]. The primary symptoms of knee osteoarthritis are joint pain, stiffness, limitation and movement [2]. The prevalence of knee osteoarthritis in India is 28.7% [3].
In individuals with OA knee the joint has limited flexion and extension ROM. This is the result of pain, damaged articular cartilage, loss of extensibility of the capsule surrounding the joint and muscles acting over the joint [5].
Chondrocytes cells within the cartilage malfunction during the pathogenesis of OA and this may likely [5].

Flexibility is defined as ability of a muscle to lengthen and allow joint move through a ROM [2]. The flexibility degree of hamstrings and quadriceps group of muscles contribute to smooth and precise ambulatory pattern in knee joint [2].

Hence the individual is predisposed to injuries and musculoskeletal dysfunction with inadequate flexibility. Hence, there is a strong speculation of knee OA with poor hamstring flexibility [2].

Management of knee OA is mainly concentrated on reducing pain, increasing joint ROM and improving extensor muscle strength, neglecting ligamentous and muscular tightening which affects lower limbs function and gait [2].

There is a little concentration on stretching the musculature and greater concentration are imposed in strengthening the musculature. Hence there is a need to stretch the musculature around the joint along with strengthening [2].

According to Salvi Shah, effect of MFR was seen for hamstring tightness in healthy individuals. But effect of MFR on hamstring tightness and pain in knee osteoarthritis individuals has not been evaluated [8].

**Myofascial release technique (MFR) [4]**

MFR is a soft tissue mobilization technique, defined as "the facilitation of mechanical, neural and psycho physiological adaptive potential as interfaced via the myofascial system". By MFR there is a change in the viscosity of the ground substance to a more fluid state which eliminates the fascia's excessive pressure on the pain sensitive structure and restores proper alignment.

Hence, the need of study is to find the effect of MFR on pain, hamstring tightness and functional disability in individuals with OA knee.

Hence, the aim of this study is comparing the effect of MFR on pain, hamstring tightness and functional disability in individuals with knee osteoarthritis.

The purpose of this study is to study the added effects of MFR along with conventional treatment on pain, hamstring tightness and functional disability in knee osteoarthritis individuals using VAS, Active knee extension test range of motion (ROM) and Knee injury and osteoarthritis outcome score (KOOS).

## 2. Methodology

1. Study design: Experimental
2. Study type: pre and post experimental type
3. Sampling method : Convenient
4. Sample size: 30
5. Study setting: Various hospitals and clinics in and around city.
6. Duration of study: 6 months
7. Treatment time- 1 week. 6 days /week.

## 3. Inclusion criteria

1. AGE GROUP: 40-60 [1].
2. Both male and female population [1].
3. Population with more than 20 degrees of hamstring tightness [4].
4. Radiographic evidence of grade 3 and 4 in Kellegren and Lawrence criteria of knee osteoarthritis [12].
5. Tibiofemoral OA [1].

## 4. Exclusion criteria

1. History of lower limb surgeries. (past 6 months) [1].
2. Other pathologies related to hip and knee-septic arthritis [1].
3. Hypersensitive skin [3].
4. Recent lower limb fractures (past 6 months) [1].
5. Circulatory pathologies- DVT, VARICOSE VEINS.
6. Patients who cannot go in prone lying.

## 4. Outcome measures

**VAS [8]**

It consists of a line 10 cm in length with the left extremity indicating 'no pain' and the right extremity indicating 'unbearable pain'.

Participants will be asked to mark the line to indicate the level of pain. Reliability of this scale is: ICC=0.71-0.94

**Active knee extension test [5]**

Reliability of this test IS: ICC=0.87-0.94

Patient position: Supine lying

Straps over the front of the participants pelvis and around the plinth to maintain the pelvis in a neutral position during hamstring measurements.

The participant was asked to flex the hip of the test leg so that it touches the PVC bar.

The participant was then asked to straighten his leg out the knee as far as he can.

Then the goniometer was then placed over the lateral knee joint line, the moveable arm was aligned with the lateral malleolus of the ankle and the stationary arm was aligned with the greater trochanter parallel to the femur.

The goniometer measured the angle of knee extension in degree.

- **Knee injury and osteoarthritis outcome score (KOOS) (**test reliability for pain is 0.85, for symptoms is 0.93, daily living is 0.75, for sport recreational activities is 0.81and for knee related quality of life is 0.86) [11].

The knee injury and osteoarthritis outcome score (KOOS) is a questionnaire designed to assess short and long-term patient –relevant outcomes following knee injury. The KOOS is self-administered and assesses five outcomes: pain, symptoms, activities of daily living, sport and recreation function, and knee-related quality of life.

The KOOS meets basic criteria of outcome measures and can used to evaluate the course of knee injury and treatment outcome. KOOS is patient-administered, the format is user-friendly and it takes about 10 minutes to fill out.

**Interpretation of KOOS scale**

Scores are transformed to a 0-100 scale, with zero representing extreme knee problems and 100 representing no knee problems as common in orthopaedic scales and generic measures.

Scores between 0 and 100 represent the percentage of total possible score achieved.

The score was calculated the help of online tool calculator ---OrthoToolKIt

**6. Sampling and study design:** Subjects were divided into 2 groups A and B by chit method.

Group A received Myofascial Release technique with conventional treatment while Group B received only conventional treatment.

**7. Procedure**

1. The study was began with a presentation of synopsis to an ethical committee and after approval from the ethical committee.
2. Then various hospitals were visited in and around the city.
3. The subjects were selected on the basis of inclusion and exclusion criteria.
4. The subjects were be divided into 2 groups by chit method (40 subjects each)
5. **Group A:** Subjects were given MFR plus conventional treatment OA knee protocol

**Myofascial release technique [4].**

1. Patient position: Prone position

Light stroking (2-3 min) [10].

Hands-Contact is made with fist.

Light pressure is applied with the fist over the hamstrings proximal to distal direction (2-3 mins).

Myofascial release technique (MFR) [7]. MFR is given with the ulnar border from proximal to distal direction with a light gentle pressure over the hamstring muscle until the slack in the skin is loosened.

Every stroke is to be held for 30 seconds, 5 repititions per session.

The hand position was crossed in order to work as energy efficiently as possible.

All the subjects will be instructed to not perform any flexibility or stretching exercises of lower limb during the treatment period.

**Conventional treatment**

TO REDUCE PAIN –Ultrasound [6].

MODE- Continuous mode

Transducer head- 1 MHz

Time -5 minutes

Intensity-1.0 watts-cm

**Exercises**

1. Static quads-10 reps, 6 sec hold, twice a day.
2. Static hamstrings- 10 reps, 6 sec hold, twice a day.
3. Static adductors- 10 reps, 6 sec hold, twice a day.
4. Static abductors-10 reps, 6 sec hold, twice a day.
5. VMO strengthening-10 reps twice a day.
6. Active knee flexion -10 reps, twice a day.
7. SLR -10 reps, 6 sec hold, twice a day.
8. dynamic quadriceps-10 reps, twice a day

**Group B:** Subjects were given conventional OA knee protocol.

To reduce pain –Ultrasound [6].

MODE- Continuous mode

Transducer head- 1 MHz

Time -5 minutes

Intensity-1.0 watts-cm

**Exercises**

1. Static quads-10 reps, 6 sec hold, twice a day.
2. Static hamstrings- 10 reps, 6 sec hold, twice a day.
3. Static adductors- 10 reps, 6 sec hold, twice a day.
4. Static abductors-10 reps, 6 sec hold, twice a day.
5. VMO strengthening-10 reps twice a day.
6. Active knee flexion -10 reps, twice a day.
7. SLR -10 reps, 6 sec hold, twice a day.
8. Dynamic quadriceps-10 reps, twice a day

**8. Data analysis and statistical analysis**

Reduction in pain, improvement in hamstring flexibility and functional disability was assessed by VAS, goniometry and KOOS scale.

The data was entered in Excel spread sheet, tabulated and subjected to statistical analysis.

The data entered was analyzed using primer of biostatistics version 7.0 checking Effect of myofascial release on pain and hamstring tightness in individuals with knee osteoarthritis-an experimental study. Data analysis was done for Group A and Group B using outcome measures Visual Analogue Scale (VAS), active knee extenstion test (Goniometry) and KOOS scale.

PRE and POST data analysis for VAS, active knee extension test and KOOS Scale was done by paired t-test for both Group A and Group B.

Group A and Group B inter group analysis was done using unpaired t-test.

**Table 1:** Intra group vas (Group A and Group B)

| Outcome measure | Pretreatment Mean±sd | Post treatment Mean±sd | T value | P value | Result |
|---|---|---|---|---|---|
| Vas (a) | 6.673±1.037 | 2.933±0.83 | 31.41 | <0.0001 | Highly significant |
| Vas(b) | 6.66±1.64 | 4.393±1.73 | 13.156 | <0.0001 | Highly significant |

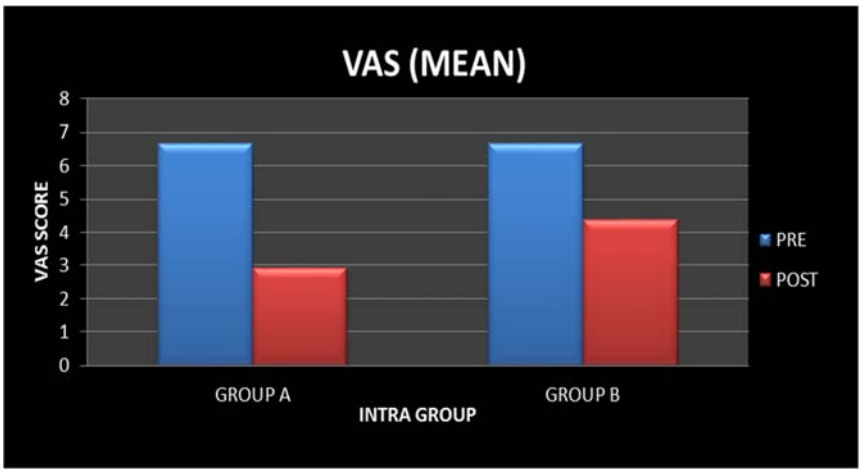


**Fig 1:** Intra Group Vas (Group A and Group B)

**Table 2:** Intra Group AKT (Group A and Group B)

| Outcome measure | Pretreatment Mean±sd | Post treatment Mean±sd | T value | P value | Result |
|---|---|---|---|---|---|
| Akt (a) | 51.47±18.68 | 34.53±18.29 | 5.434 | <0.0001 | Highly significant |
| Akt (b) | 47.8±15.25 | 41.4±15.35 | 1 8.330 | <0.0001 | Highly significant |

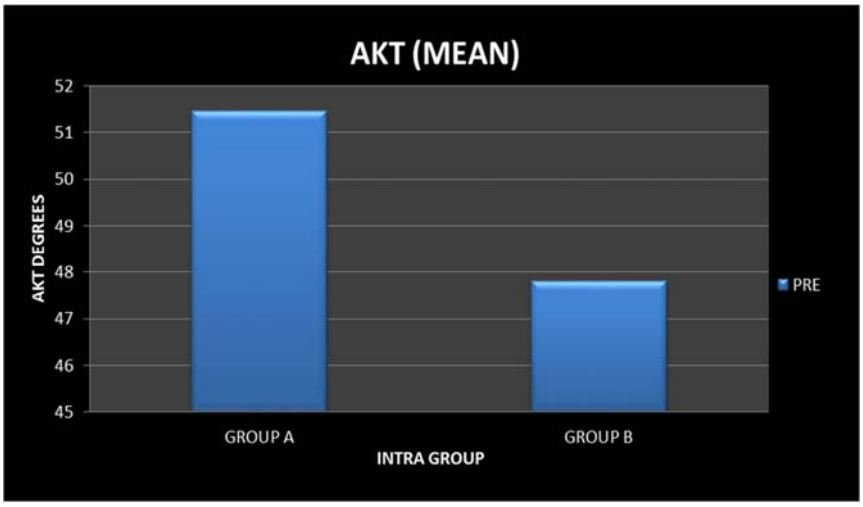


**Fig 2:** Intra Group AKT (Group A and Group B)

**Table 3:** Intra Group KOOS (Group A and B)

| Outcome measure | Pretreatment Mean±sd | Post treatment Mean±sd | T value | P value | Result |
|---|---|---|---|---|---|
| KOOS (A) | 34.93±11.37 | 70.73±4.667 | 10.289 | <0.0001 | Highly Significant |
| KOOS (B) | 34.13±7.615 | 56.6±6.34 | 20.60 | <0.0001 | Highly Significant |

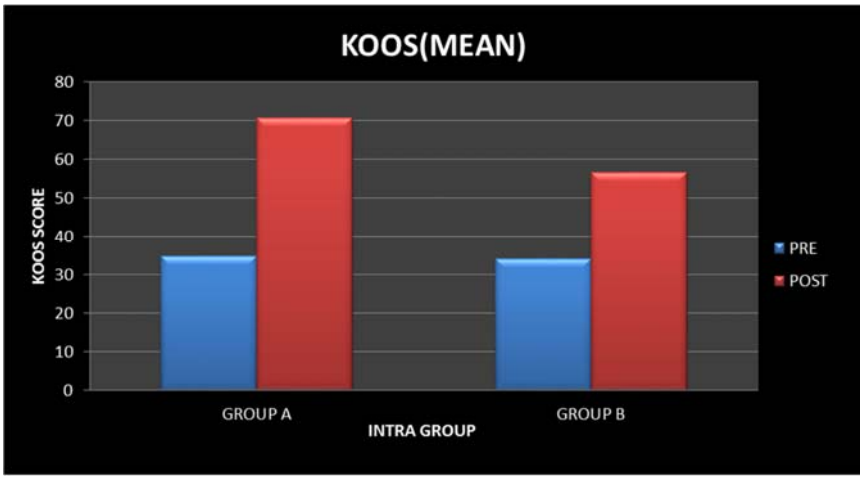


**Fig 3:** Intra KOOS (Group A and B)

**Table 4:** Inter Group Vas

| Outcome measure | Pretreatment Mean±sd | Post treatment Mean±sd | T value | P value | Result |
|---|---|---|---|---|---|
| VAS | 3.74±0.4611 | 2.26±0.66 | 7.036 | <0.0001 | Highly Significant |

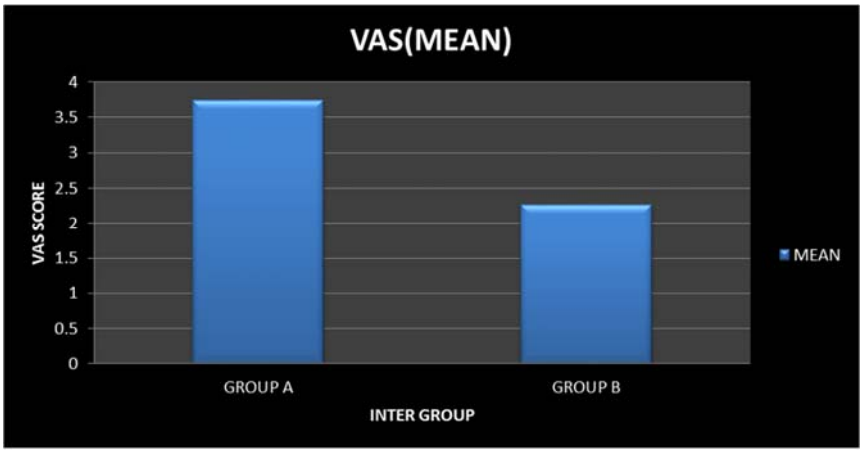


**Fig 4:** Inter Group Vas

**Table 5:** Inter Group AKT

| Outcome measure | Pre treatment Mean±sd | Post treatment Mean±sd | T value | P value | Result |
|---|---|---|---|---|---|
| AKT | 20±4.928 | 6.4±1.352 | 10.307 | <0.0001 | Highly Significant |

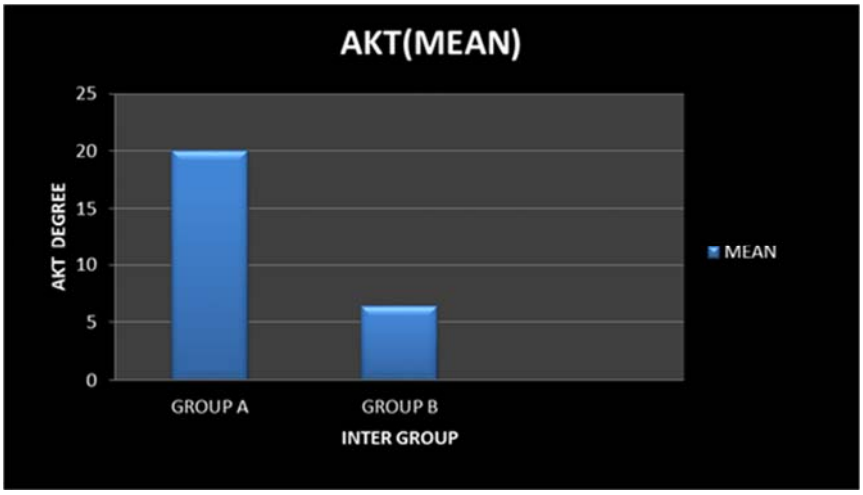


**Fig 5:** Inter Group AKT

**Table 6:** Inter Group KOOS

| Outcome measure | Pretreatment Mean±sd | Post treatment Mean±sd | T value | P value | Result |
|---|---|---|---|---|---|
| KOOS | 33.53±7.963 | 22.47±4.224 | 4.755 | <0.0001 | Highly Significant |

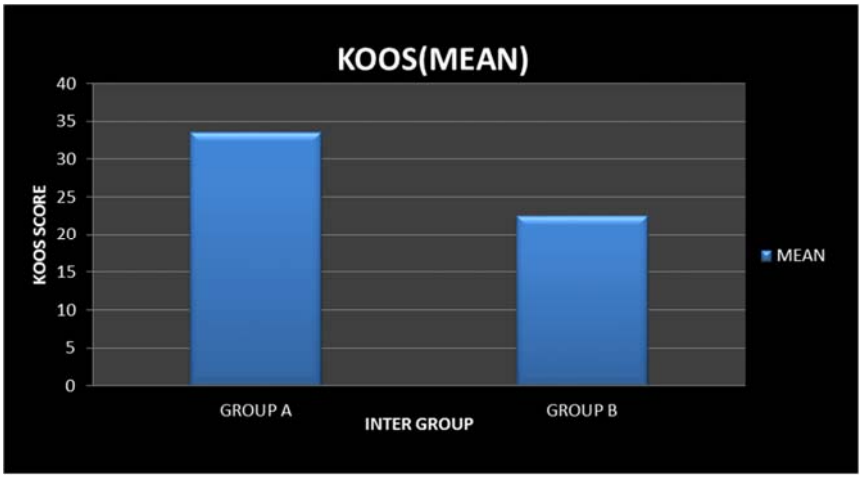


**Fig 6:** Inter Group KOOS

## 9. Results

The techniques used in this study are myofascial release with conventional treatment (group A) and conventional treatment (group B).

The finding of this study revealed significant difference in pain (VAS) in group A as compared to group B with the mean values of 3.74(Group A) and 2.26(Group B) (t value =7.036,p value=<0.0001)

The finding of this study revealed significant difference in improvement in hamstring flexibility (AKT) in group A compared to group B with the mean values of 20(group A) and 6.4(group B) (t value =10.30, p value= <0.0001)

The finding of this study revealed significant difference and improvement in functional disability in group A as compared to group B with mean value of 33.54 and 22.47 respectively (t value=4.755, p value = <0.0001)

## 10. Discussion

The objective of this study is to find the effectiveness of MFR on pain and hamstring tightness and functional disability in individuals with knee osteoarthritis.

The present study result shows subjects in experimental group A has significant reduction in pain improvement in AKE-ROM and functional disability when compared to conventional group B. Group A individuals were given MFR plus conventional treatment and Group B individuals were given only conventional treatment.

Pain relief in Group A is mainly obtained because of MFR in addition to conventional treatment which include ultrasound plus knee isometric exercises. According to FONTERA WK, the reduction of pain after MFR treatment may be due to the inhibitory effect on the golgi tendon organ [1]. Due to which there is reduction in neuronal motor discharges and relaxes the musculotendinous unit by resetting its resting length and modifying the pacinian body, this reflexively helps to relax in musculotendinous tension and reduces the perception of pain. Also MFR in combination with ultrasound therapy helps in reducing knee pain [1]. The exact effect is unknown but heating is the most important effect as it encourages regional blood flow and increases connective tissues extensibility [7].

To improve hamstring flexibility the experimental group was given MFR treatment. According to Salvi Shah and J. Miller, the pressure associated with MFR causes the golgi tendon organ to sense a change of tension in the muscles and responds to this high or prolonged tension by reflexively inducing relaxation of muscle spindles [8]. So, there was improvement in hamstring muscle tightness in group A with MFR. (with the mean value 20 group A)

As there was reduction in pain and improvement in hamstring flexibility in Group A and there was also reduction in functional disability in these patients at the end of 1 week.

The primary limiting factors for reduced joint movements are pain, tight muscles, fascia, capsule and tendon. Mainly treatment of OA includes ultrasound therapy and isometrics exercises with lack of focus on tight muscles [2]. So, there is a need to concentrate on tight muscles, because the golgi tendon organ in the muscle spindle has an ability to reflexively relax and lengthen the muscle in response to MFR treatment.

Group A showed significant reduction in pain with MFR and conventional treatment increase AKE-ROM improved hamstring flexibility and reduction in functional disability.

Group B received only conventional treatment which included ultrasound and isometric exercises. Group B showed significant reduction in pain, improvement in hamstring flexibility and reduction in functional disability.

The finding of this study revealed significant difference in pain (VAS) in group A as compared to group B with the mean values of 3.74(Group A) and 2.26(Group B) (t value =7.036,p value=<0.0001) The finding of this study revealed significant difference in improvement in hamstring flexibility (AKT) in group A compared to group B with the mean values of 20(group A) and 6.4(group B) (t value =10.30, p value= <0.0001) The finding of this study revealed significant difference and improvement in functional disability in group A as compared to group B with mean value of 33.54 and 22.47 respectively (t value=4.755, p value = <0.0001). In this study Group B did not significant reduction in pain, improvement in hamstring

flexibility and reduction in functional disability in comparison to Group A.
Thus, study states that MFR in addition to conventional treatment for pain, hamstring tightness and functional disability is more effective than only conventional treatment.

## 11. Conclusion
This study revealed that myofascial release technique with conventional treatment for hamstring tightness and knee pain and functional disability was more effective than just conventional treatment in osteoarthritis patients at the end of 1 week.

## 12. Limitations
Any differences in gender was not considered.
The range for pain score was variable.
Long term effect post treatment was not assessed.

## 13. Future scope
Gender differences can be considered.
Limited range can be taken for pain score.
Long term effect post treatment can be assessed.
This study can be done with more weeks of protocol to see more effect of the treatment.

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