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Effect of Myofascial Release on Hamstring Tightness among Knee Osteoarthritis Patient

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ABSTRACT

Background: Conventional physiotherapy treatment such as strengthening and stretching are widely practiced by physiotherapist on patient with knee Osteoarthritis. However, usage of myofascial release technique is quite rare among therapist to treat knee Osteoarthritis and there is lack of evidence supporting the importance of Myofascial release in treating knee Osteoarthritis. **Objective**: To study the effect of Myofascial release technique in hamstring tightness among knee Osteoarthritis patient. **Method**: 30 subjects were selected based on randomized control trial method. Group A undergone both myofascial release and conventional therapy while group B only received conventional therapy treatment. Pre and post-test of active knee extension test, VAS pain score and Knee Osteoarthritis Outcome Score(KOOS) was taken and recorded. **Result**: There are significant difference in pain VAS score in Group A as compared to Group B with the mean values of 1.73(group A) and 0.87(group B)(t value=2.432,p value=<0.024). Another finding in this study was significant difference in improvement in hamstring flexibility (AKET) in group A compared to group B with the mean values of 12.13(group A) and 8.53(group B)(t value=4.106,p value=<0.0001). As for KOOS, there are significant difference and improvement in functional disability in group A as differentiated to group B with the mean values of 12.13(group A) and 8.53(group B)(t value=4.106,p value=<0.0001).**Conclusion**: The study showed that Myofascial release shows effectiveness in improving active knee extension range of motion, improved pain VAS score and decreased functional disability in patient with knee osteoarthritis condition.

Keywords: Osteoarthritis, Myofascial release, KOOS, pain, hamstring tightness.

INTRODUCTION:

Osteoarthritis nowadays is classified as the most common degenerative disease and it is the primary cause of disability and pain among adult individuals. Joint injury, heredity, obesity and aging are considered the etiology of Osteoarthritis. Till now, the exact mechanism of Osteoarthritis hasn't fully discovered yet and until today there are no interventions that is available to repair the damaged cartilage or slow down the process. (Chen, Di et al.,2016)

One of the foremost major risk factors for osteoarthritis is age factor. A majority of individuals over the age of 65 were diagnosed with radiographic changes in one or more joints. To narrow it down, knee osteoarthritis, in other named as degenerative joint disease of the knee, is the outcome of constant wear and tear process and gradual loss of the articular cartilage. This disease can be seen more commonly in

elderly women and men and can be divided into 2 categories which is primary osteoarthritis and secondary osteoarthritis. Primary Osteoarthritis is the articular degeneration with no specific underlying cause and reasons. Secondary osteoarthritis is the result of abnormal articular cartilage, such as an abnormal concentration of force throughout the joint, such as the cause after trauma or Rheumatoid arthritis (RA).(Hsu H & Siwiec RM.,2021)

In recent years, obesity has become a worldwide epidemic characterized by an increased in body composition of fat. The relation between obesity and OA has long been recognized. Patients with obesity can develop OA earlier and have more symptoms, higher risk for infection and more technical difficulties for total joint replacement surgery. additionally to increased biomechanical loading on the knee , obesity is assumed to contribute to low-grade systemic inflammation through secretion of adipose tissue-derived cytokines, called adipokines.

Therapist are more focused in strengthening the muscle rather than stretching it. Very mild focus is given on stretching the muscles. Combination of stretching and strengthening are needed for patients with knee Osteoarthritis. Despite significant advances in OA research in recent years, little is understood about the molecular underpinnings of OA onset and progression. OA is a complex illness caused by a variety of variables. The entire joint, including the articular cartilage, subchondral bone, synovial tissues, and menisci, is affected by OA. It is currently unknown in which of these joint tissues OA damage occurs first during disease beginning; this is crucial because it is directly related to OA treatment. Understanding the molecular mechanisms behind these problems would help to speed up the development of new OA treatments. Interventions of knee Osteoarthritis nowadays are focused mainly on reducing the pain, improving the range of motion of knee, strengthening the knee flexor and extensor muscle, reducing the tightness of muscle which will affect the lower limb function. (V., M., C., S., & K., M.,2016)

Myofascial Release is a type of effective hands-on interactive method that provides stretching, compression and sustained pressure into restricted areas of fascia (connective tissue) in the body to eliminate pain and restore motion.

Problem Statement: Although the effect of normal physiotherapy treatment and Myofascial release technique on knee Osteoarthritis patient are known separately, their effect is not widely or well knowingly yet known when applied together. To the best of my knowledge, less amount of study investigating the effect of Myofascial release together with conventional physiotherapy treatment among patient with knee Osteoarthritis. Therefore, the aim of the current study is to study the effect of Myofascial release together with conventional physiotherapy treatment on hamstring tightness and pain among knee Osteoarthritis patient using outcome measure such as VAS and knee Osteoarthritis outcome index.

Objective: To rule out the effect of myofascial release in pain reduction among knee Osteoarthritis patient.

METHODOLOGY

Study Design:

This study was done by using randomized controlled trial design method. Two group was allocated which is group A and group B. Group A received myofascial release therapy and conventional therapy while group B received only conventional therapy. The subject received intervention two times a week and their informed consent was told and taken to before the study start.

Treatment Duration:

Treatment time was twice a week. Each session last about 1 hour.

Sampling Method:

30 participants will be collected from Kedah's old folk home using convenience sampling method. Subject was divided into 2 group. Group A received Myofascial Release technique with conventional

treatment while Group B received only conventional treatment.

Inclusion Criteria:

1. Patient aged 40-60 years old,
2. Having hamstring tightness of more than 30 degree,
3. X-ray showing evidence of reduced knee spaced/osteoarthritis symptoms,
4. Having osteoarthritis in Knee joint/Tibiofemoral joint.

Exclusive Criteria:

1. Recent Fracture,
2. Any circulatory disease,
3. Past history of knee surgery,
4. Any skin sensitivity.

Parameters:

Visual Analog Scale of 10 cm long will be used to assess pain scale. Active Knee Extension Test will be done and measured using goniometer. Knee Osteoarthritis Outcome Score is a series of questionnaire designed to assess the patients' opinion about their knee and associated problems. This score consists of five outcomes pain, symptoms, activities of daily living, sport and recreation function, and knee-related quality of life. It takes approximately 10 minutes to finish it. The score is a percentage score from 0 to 100, 0 representing extreme problems and 100 representing no problems. The calculation was entered and interpretated in online OrthoKit.

Procedure:

Conventional Treatment:

1. Thermal therapy for 10 minutes using hot pack.
2. Static quads-10 reps, 10 second hold, twice a day.
3. Static hamstrings- 10 reps, 10 second hold, twice a day.
4. Static adductors- 10 reps, 10 second hold, twice a day.
5. Static abductors- 10 reps, 10 second hold, twice a day.
6. Active knee flexion- 10 reps, twice a day.
7. Straight leg raise- 10 reps, 10 second hold, twice a day.

Myofascial Release Technique:

1. Patient was positioned in prone lying comfortably.
2. Their hamstring area was exposed and applied with massage oil.
3. The procedure begun with light stroking using hand over hamstring muscle from proximal to distal of the hamstring.
4. Patient was informed not to do any kind of stretching or flexibility exercise that might affect the outcome of this research.

Data Analysis Method:

The data analysis was performed by numerical coding. Descriptive statistic was used for data analysis which will focus through table and chart. Tabulation and computation of frequencies and percentages was calculated on selected variables. The data was entered in SPSS software to obtain necessary analysis.

Result:

Table 1: Demographic characteristics of study samples

	Frequency	Percentage (%)
Gender		
Male	22	73.3
Female	8	26.7
Ethnicity		
Malay	14	46.7
Chinese	16	53.3
Indian		
Study group		
MFR	15	50
CT	15	50
Age category		
45 - 50	9	30.0
51 – 55	12	40.0
56 – 60	8	26.7
>60	1	3.3

Table 1 above shows the demographic data and characteristics of the study samples. From the 30 participants, 22 of them are males and 8 females with (73.3%) and (26.7%) respectively. As for ethnicity, Malay population that participated in the research was 14(46.7%) while Chinese population that participated was 16(53.3%). Both the study group has the same number of participants.

Table 2: Results of VAS, AKET and KOOS in MFR and CT Group

	Mean	SD	95% CI of the difference		t	p[a]
			Lower	Upper		
MFR group						
VAS- pre intervention	4.20	1.27	1.056	2.410	5.490	0.000
VAS- post intervention	2.47	0.92				
AKET- pre intervention	39.13	4.67	-12.089	-9.778	-20.297	0.000
AKET- post intervention	50.07	4.61				
KOOS- pre intervention	75.67	1.80	-13.351	-10.915	-21.364	0.000
KOOS- post intervention	87.80	1.27				
CT group						
VAS- pre intervention	3.47	0.83	0.512	1.221	5.245	0.000
VAS- post intervention	2.60	0.63				
AKET- pre intervention	67.80	7.74	-3.574	-2.826	-18.330	0.000
AKET- post intervention	71.00	7.44				
KOOS- pre intervention	76.40	1.40	-9.966	-7.100	-12.773	0.000
KOOS- post intervention	84.93	2.05				

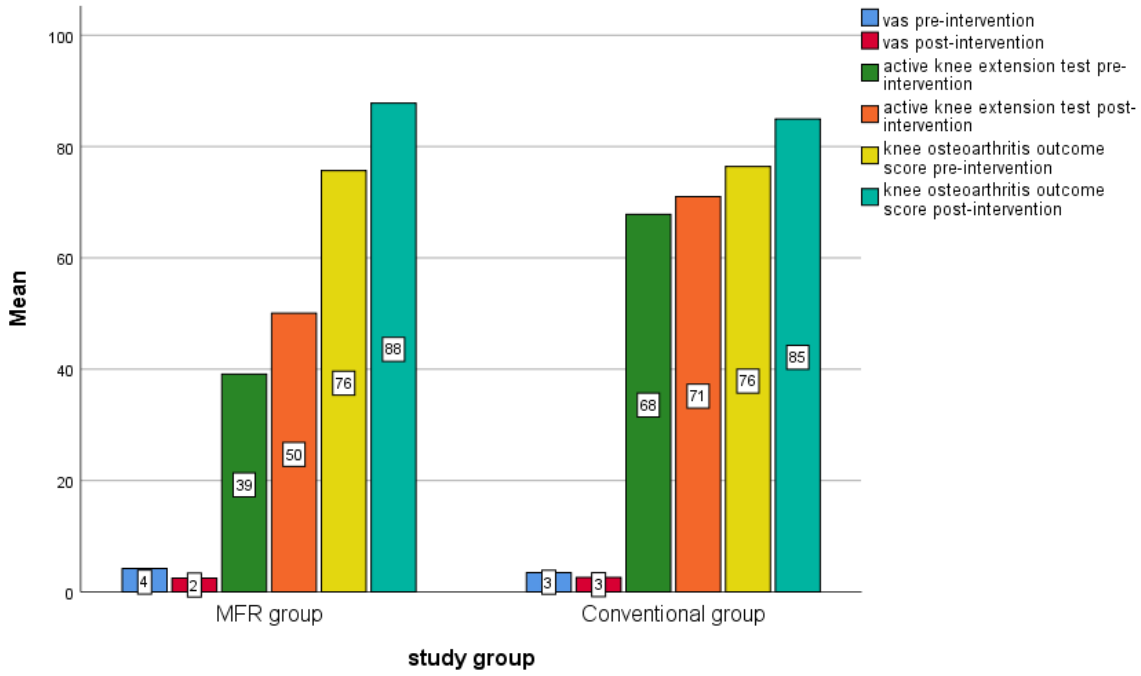
Moving on to table two are the results of VAS pain score, active knee test, and also the knee osteoarthritis outcome score. The result of this study revealed that there were significant difference in pain VAS, Active Knee Extension Test and KOOS.

Table 3: Comparison of outcome results between MFR and CT Group

	Mean	SD	SEM	95% CI of the difference		t (df)	P[a]
				Lower	Upper		
VAS difference							
MFR	1.73	1.22	0.32	0.13672	1.59661	2.432	0.024
CT	0.87	0.64	0.17	0.12589	1.60745	(21.134)	
AKET difference							
MFR	12.13	2.20	0.57	1.80383	5.39617	4.106	0.000
CT	8.53	2.59	0.67	1.80173	5.39827	(28)	
KOOS difference							
MFR	12.13	2.20	0.57	1.80383	5.39617	4.106	0.000
CT	8.53	2.59	0.67	1.80173	5.39827	(28)	

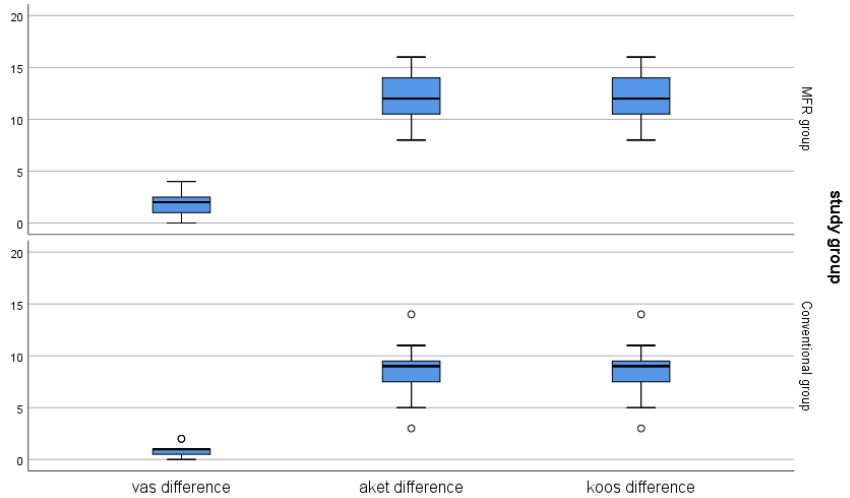
The technique that was used in this research are myofascial release with conventional therapy(Group A) and conventional therapy(Group B). In table three it can be seen that there are significant difference in pain VAS score in Group A as compared to Group B with the mean values of 1.73(group A) and 0.87(group B)(t value=2.432,p value=<0.024). Another finding in this study was significant difference in improvement in hamstring flexibility (AKET) in group A compared to group B with the mean values of 12.13(group A) and 8.53(group B)(t value=4.106,p value=<0.0001). As for KOOS, there are significant difference and improvement in functional disability in group A as differentiated to group B with the mean values of 12.13(group A) and 8.53(group B)(t value=4.106,p value=<0.0001).

Figure 1: Distribution of VAS, AKET and KOOS in pre and post intervention between MFR and CT group



The above graph of bar chart is showing the pre and post intervention distribution of VAS, AKET and KOOS between MFR and CT group. In MFR group the VAS mean level was reduced to 2 from 4 and the post AKET that measure range of motion shows improvement. As for KOOS, the mean value of post intervention was 88.
In CT group, the VAS mean score shows slight changes and the score for AKET was mildly improved. Same goes to KOOS score.

Figure 2: Distribution showing changes in VAS, AKET and KOOS after intervention between MFR and CT group



Above graph shows a box spot distribution of changes in VAS, AKET and KOOS. For MFR group, their difference was in the range of 0 to 5, 5 to 17 and 5 to 18 respectively. For CT group, the score was mild with 0 to 5, 5 to 13 and 5 to 12 respectively.

Discussion:
The main objective of this study is to find the effectiveness of MFR on pain, hamstring tightness and also functional disability that was measured using KOOS outcome score in individuals with knee osteoarthritis problems.
The current result in the study shows that subjects in experimental group A showed a significant

reduction in pain score, AKT range of motion and also in functional disability when compared to group B, which was a conventional group. Group A was given an extra treatment which was Myofascial release plus with conventional therapy, and group B were given only conventional treatment.
As seen from the results, the pain relief in experimental group A is obtained because of MFR together with conventional therapy such as thermal and knee isometric exercises. Based on FONTERA WK, the reduction in pain after the Myofascial release treatment is might be because of the inhibitory effect on an organ which is the Golgi tendon. This is because of the reduction of the neuronal motor discharges, and it starts to relax the musculotendinous unit by slowly altering the Pacinian body and also resetting its resting length. This alteration and reset assist in relaxing the musculotendinous tension and reduce the discernment of pain. (S, Arul & VK, Mohandas & N, Soundarya.,2019)

In addition, Myofascial release with the combination of ultrasound machine therapy shows benefits in reducing knee pain suffered by the patient. To rule exact or specific effect is still unknown but thermal therapy or heat shows that it is a very important effect as it stimulates extra blood flow and improves the connective tissues extensibility.(Kozanoglu, Erkan et al.,2003) The effectiveness of the myofascial release on the peripheral nervous system can be a possible next attention in upcoming investigations that involves pain and myofascial release treatment. On the other hand, there is a need to evidence-based the myofascial meridians proposed by Myers. (Myers.,2014)

It is known that the myofascial release technique is likely directed to a fascial component of the myofascial unit but a slightly different method mechanically. Our skin and fascia are highly sensitive structures and allow them to play an important major function in maintaining the normal body function. (Benjamin M. 2009) There are many hypotheses in which showing how a soft tissue mobilisation works such as improved blood flow, improved lymphatic drainage of toxins, decreased tissue stiffness, alteration in neuromuscular activity and a reduced in the inflammatory response.(Weerapong, Pornratshanee et al.,2005) Moreover, the fascia also contains a receptor named mechanoreceptors and also smooth muscle receptors in, which when stimulated, it can help in lowering down the sympathetic tone that will lead to tonus changes in muscle. (Schleip, Robert.,2003)

To improve the hamstring flexibility, the experimental group was given myofascial release treatment. According to Salvi Shah and J. Miller, the pressure that is associated with the MFR treatment will cause the Golgi tendon organ to sense changes in the tension in the muscles and will automatically responds to this high or prolonged tension by reflexively instigating relaxation of muscle spindles. (Salvi Shah.,2013) So, in our study, there was an improvement in the hamstring muscle tightness in Group A with MFR. (mean value of 12.13 group A)
From the results, it can be seen that the pain was reduced and the hamstring flexibility was improved in group A, and there was also a reduction in the Knee Osteoarthritis Outcome Score in these patients at the end of the study.

In this study, there are significant reduction in pain with myofascial release group A and conventional treatment increase active knee extension's range of motion, improved the hamstring stretching flexibility and also reduction in KOOS score that shows reduction in functional disability. Group B that only received conventional treatment that include thermal therapy, ultrasound and isometric exercises. Group B also shows significant reduction in VAS score, improvement in hamstring muscle flexibility and reduction in functional disability(KOOS score).

The result of this study showed significant difference in VAS score in MFR group A as compared to group B with the mean values of 1.73 in group A and 0.87 in group B(t value=2.432, p value=<0.024). Another finding in this study was significant difference in improvement in hamstring flexibility (AKET) in group A compared to group B with the mean values of 12.13(group A) and 8.53(group B)(t value=4.106,p value=<0.0001). As for KOOS, there are significant difference and improvement in functional disability in group A as differentiated to group B with the mean values of 12.13(group A) and 8.53(group B)(t value=4.106,p value=<0.0001). In this study, both group A and B showed significant increase in term of pain VAS, AKT and KOOS score. But group A results was far more better because of Myofascial release treatment that improve the outcome of the result. Patient in group

A feel better after treatment and their knee pain also decreased. In term of hamstring flexibility, their range of motion improved although it is widely known that every person has different kind of muscle flexibility, group A shows better improvement. As for Knee Osteoarthritis Outcome Score (KOOS), subject in group A shows reduction in total score that give meaning of reductions in functional disability. Their lifestyle has improved after the treatment.
Thus, this study states that Myofascial release together with conventional treatment in treating pain, hamstring tightness and functional disability is more effective than only conventional treatment.

Conclusion

As a conclusion, the result shows us that the myofascial release showed effectiveness in improving active knee extension range of motion, improved pain VAS score and also decreased functional disability in patient with knee osteoarthritis condition. That being said, the pain range of patient was reduced in both groups and this shows that patient was comfortable with the treatment and responded well to the intervention. This study showed significant improvement in four weeks of treatment. The result of this study can be applied clinically to assist healthcare workers professionals manage knee osteoarthritis patients better. This type of study is not yet famous and other researchers out there can take this study as a guide and come up with a better result. Last but not least, new study with better and bigger sample size with more inclusion and exclusion criteria are required to validate our results.

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