



ISSN Print: 2394-7500
ISSN Online: 2394-5869
Impact Factor (RJIF): 8.4
IJAR 2024; 10(11): 38-43
www.allresearchjournal.com
Received: 24-08-2024
Accepted: 27-09-2024

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A study to compare the effectiveness of myofascial release versus Maitland mobilization on pain and functional disability in patients with osteoarthritis, a comparative study

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Abstract

Background and Objectives: Posture is the alignment of body segments in certain positions such as standing, lying and sitting. Any deviation from normal postural curve adversely affects the adjacent joints and muscles leading to alteration of body mechanics. Osteoarthritis knee is the alteration in normal static and dynamic position or motion of the knee during coupled tibiofemoral movements. Knee Rehabilitation exercises are an effective treatment protocol for knee osteoarthritis. The objective of the study was to evaluate the effectiveness of maitland mobilisation versus myofascial release alone in subjects with osteoarthritis of the knee.

Methods: 30 subjects with a diagnosis of osteoarthritis of the knee were randomly allocated in two groups. Group A received maitland mobilization and Group B received myofascial release technique. The outcome was assessed in terms of the WOMAC test and Numeric Pain Rating Scale (NPRS) at baseline and immediately post-intervention.

Results: The result of the present study demonstrated no statistically significant difference between the groups for the 3 outcome variables, but significant improvement was seen within the groups for all outcomes. Group B showed better improvement than Group A for osteoarthritis of the knee.

Interpretation and Conclusion: The present study concludes that both training protocols were equally effective in correcting osteoarthritis of the knee. Further, it was also noticed that Group B was more effective in improving in osteoarthritis of knee and muscle strength and reducing pain than Group A. Hence while applying the protocol myofascial release technique was better than maitland mobilization applied alone.

Keywords: Knee osteoarthritis, maitland mobilization, myofascial release technique

Introduction

Osteoarthritis of the hip and knee is the most common form of arthritis and causes musculoskeletal pain and physical dysfunction^[1]. Osteoarthritis is an active disease process involving articular cartilage destruction subchondral bone thickening and new bone formation. Osteoarthritis is the most common cause of musculoskeletal pain and disability, it is most overcome with a variety of problems, such as joint, pain, stiffness, limitation of motion, motor and sensory dysfunction and functional impairment that prevent them from participating in regular physical activity^[2]. The knee joint is the most frequently affected by osteoarthritis. Osteoarthritis knee is two times more prevalent than osteoarthritis hip in people aged over 60 years^[3]. Clinically osteoarthritis knee is characterized by pain during weight bearing, tenderness, and limitations of knee movement, crepitus, occasional effusion and variable degree of local inflammation^[4]. Pain is the most frequent reason for patients with osteoarthritis knee to seek medical attention and rehabilitation, pain and stiffness with result in a loss of physical function and self-independence. The presence of osteoarthritis-related knee pain has also been associated with an increase in the risks of physical disability in the community^[5]. Osteoarthritis is often graded on radiograph according to Kellgren and Lawrence, an ordinal scale of 5 levels that is, grade 0- normal radiograph, Grade 1- doubtful narrowing of joint space and possible osteophytes, Grade 2- definite osteophytes, narrowing of joint space, Grade 3- moderate multiple osteophytes, definite narrowing of joint space,

sclerosis and possible deformity of bone contour, Grade 4-large osteophytes marked narrowing of joint space, severe sclerosis and definite deformity of bone contour [5]. Many articles shown the definition of osteoarthritis given by the Americans College of Rheumatology Diagnostic and Therapeutic Criteria Committee, which also told the Kellgren and Lawrence radiological criteria for classifications of osteoarthritis knee is a “heterogeneous group of conditions that lead to joint symptoms and sign which are associated with defective integrity of articular cartilage, in additional to related changes in the underlying bone at a joint margin [6]. The prevalence of knee osteoarthritis in the Netherlands in 2007 was 14.3 per 1000 for men and 23.8 per 1000 for women.¹ 7.50% and 13.6% in China, in Bangladesh and India reported 5.78% and 10.20% respectively [7].

The treatments of knee osteoarthritis are currently limited to the management of symptoms rather than reducing disease progression. An evidence-based approach to management should include patient education about osteoarthritis and its management including pain management, an option to improve function, decrease disability and prevent or retard the progression of the disease [6]. Pharmacological intervention include paracetamol, corticosteroid, oral and topical NSAIDS, opioid analgesics, glucosamine, vitamin E supplements. Surgical procedures include joint debridements osteotomy, unicompartment arthroplasty and total knee arthroplasty. Physiotherapy management includes thermotherapy that decreases spasms, and pain and helps to increase joint range of motion. Cryotherapy, electrotherapy which include TENS and ultrasound. Exercises like strengthening of quadriceps, isometric exercises and cycling [2]

Maitland's concept of mobilization with movements is a contemporary form of joint mobilization consisting of a therapist applying pain-free accessory gliding force combined with active movement, it is related to corrected minor positional faults that occur secondary to injury and that lead to maltracking of the joint resulting in symptoms such as pain stiffness or weakness [2].

Myofascial release is a manual therapy technique developed by barns to help reduce restrictive barriers or fibrous adhesion seen between layers of fascial tissue. The purpose of deep myofascial release is to release restrictions within the deeper layers of fascia. This is accomplished by a stretching of the muscular elastic component of the fascia along with the crosslinks and changing the viscosity of the ground substance of the fascia [8].

Although a randomized clinical trial exists studying the efficacy of mailand mobilization and myofascial release technique, there is a lack of evidence regarding the integration of these techniques in individuals with osteoarthritis knee India population. For this reason, additional research examining the effectiveness of the regimen is warranted. The number of patients with osteoarthritis is increasing day by day in clinical practices. It is one of the most common conditions disabling the individual suffering. The pain, functional limitations due to it affect the activities of daily living and work performance of the individual. There are many studies present to show the effectiveness of various pharmacological, non-pharmacological and surgical treatments for treatments of osteoarthritis of the knee. Also, there is availability of evidence supporting various physical therapy approaches on

exercises, strength training, proprioceptive training and electrotherapy modalities with various combinations, but there is less evidence available supporting various manual therapy approaches in the management of osteoarthritis of the knee like maitland mobilization and myofascial release. Therefore, the present study aimed at to provide evidence of the two different manual techniques in the management of osteoarthritis knee.

Methodology

The subjects were randomly allocated into two groups of 20 each. Forty pieces of papers were used, with twenty papers written with the letter “A” to identify the subjects to take into the Study group and another twenty with the letter “B” to identify the subjects to take into the Control group. All the forty pieces of paper were tightly folded and placed in a box. After shaking the box, each subject was asked to withdraw a paper. Twenty subjects with the letter “A” were enlisted under the Study group and the other twenty subjects with the letter “B” were in the Control group.

As the study includes human subjects ethical clearance is obtained from the ethical committee of K.T.G. College of Physiotherapy and KTG Hospital, Bangalore as per the ethical guidelines for Bio-Medical research on human subjects, 2000 ICMR, New Delhi. The total duration of the study was four weeks. Three sessions were carried out in the first week on alternate days followed by two days in the next week, on an alternate basis.

A total of twenty patients with osteoarthritis knee were selected by convenient sampling fulfilling inclusion criteria.⁸ They were assigned to either group A (maitland mobilization) or group B (myofascial release technique) through randomized sampling by chit method.

Both groups received conventional therapy in the form of isometric knee strengthening exercises, VMO strengthening exercises as home exercise program and ergonomics. Group A received maitland mobilization as per the guidelines. Group B received myofascial release technique [8]. The total duration of the study was four weeks. Three sessions were carried out in the first week on alternate days followed by two days in the next week, on an alternate basis.

At the end of 4 weeks, the follow-up assessment was documented. Outcome measures were Visual analogue Scale (VAS) for knee pain and Western Ontario and McMaster Universities (WOMAC) for assessing functions.



Fig 1: Mobilization technique posteroanterior movement grade I and II will be given; 2-6 bouts of 30-sec



Fig 2: Myofascial release technique starting position



Fig 4: measuring girth measurement

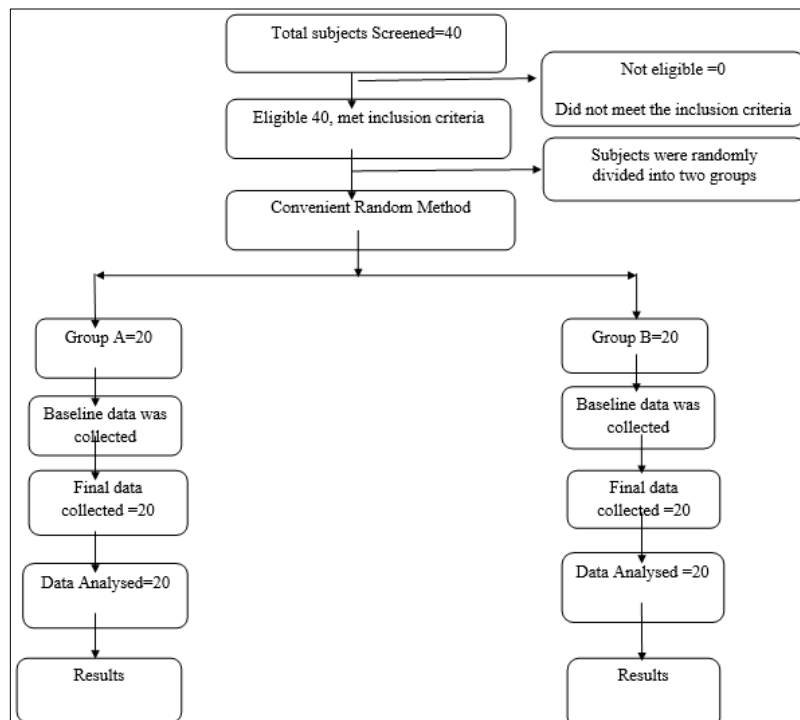


Fig 3: pain-free range of motion while the physiotherapist maintains contact with the patella. This is repeated up to 10 times

Outcome Measurements

1. Visual Analogue Scale (VAS)
The visual analogue scale is a valid and reliable measurement instrument that tries to measure a characteristic or attitude that is believed to range across a continuum of value and cannot easily be directly measured [9].
2. Western Ontario and McMaster Universities Index (WOMAC)

WOMAC is a reliable and valid index to assess patients with osteoarthritis of the hip and knee. It's designed to measure dysfunction and pain-associated osteoarthritis of the lower extremities by assessing 24 different parameters that is 17 functional activities, 5 pain-related activities and 2 stiffness categories. It is among the most sensitive of all instruments used in the assessment of osteoarthritis of the knee or hip has been widely used in clinical trials [10].



Results

Data was analysed using the statistical software SPSS 21.0 version. Both descriptive and inferential analyses have been carried out in the present study. Data with normal

distribution are represented as mean \pm sd, without normal distribution as median (range) and categorical data as counts.

Table 1: comparison of the mean value, the standard deviation of baseline assessment value of age and various outcome measures between Group A, and Group B using unpaired tests

Outcome measure	Group A baseline Mean \pm SD	Group B Baseline Mean \pm SD	t value	DF	95% CL upper lower	P value	Inference
AGE	52.15 \pm 6.12	53.25 \pm 8.14	0.4833	38	-5.71 to 3.51	0.6316	Not significant
VAS	6.635 \pm 1.408	5.915 \pm 1.526	1.5512	38	0.220 to 0.660	0.1292	Not significant
WOMAC pain	8.25 \pm 2.24	7.55 \pm 2.28	0.9779	38	-0.75 to 2.15	0.3343	Not significant
Stiffness	3.352 \pm .24	3.20 \pm 0.83	1.2859	38	-0.20 to 0.90	0.2062	Not significant
Physical function	32.60 \pm 5.04	31.75 \pm 4.17	0.5813	38	-2.11 to 3.51	0.5645	Not significant
WOMAC Score	43.50 \pm 0.02	42.50 \pm 6.65	0.4295	38	-3.71 to 5.71	0.6700	Not significant

$p < 0.01^*$ shows a statistically significant difference

Table 2: Intergroup comparison between Group A and Group B of post-intervention assessment based on outcome measure using unpaired t-test.

Outcome measure	Group-A After t/t	Group-B After t/t	t value	df	95% CL Upper-lower	P value	Inference
VAS	4.005 \pm 1.449	2.820 \pm 1.002	3.0088	38	0.388 to 1.982	0.0046*	Highly significant
WAMC pain	3.90 \pm 0.85	2.85 \pm 0.88	3.8442	38	0.50 to 1.60	0.0004*	Extremely significant
Stiffness	1.85 \pm 0.49	1.35 \pm 0.49	3.2310	38	0.91 to 0.81	0.0025*	Highly significant
Physical function	21.80 \pm 3.19	19.75 \pm 3.43	1.9571	38	-0.07 to 4.17	0.0577*	Not significant
WOMAC score	27.55 \pm 4.05	23.95 \pm 4.32	2.7195	38	0.92 to 628	0.0098*	Highly significant

$p < 0.01^*$ shows a statistically significant difference

Discussion

Research into arthritis and particularly OA has largely investigated medical intervention and physical therapy modalities including exercises. Much less emphasis has been placed on other manual therapy approaches. Several studies have investigated manual therapy for OA of the knee employing a protocol that included other forms of therapy in a multi-modal approach. The current study employed two different manual disciplines along with a standard exercises program for comparison in effective pain reduction and disability in osteoarthritis knee patients^[11].

This study proves the efficacy of myofascial mobilization at knee joints in reducing pain and disability associated with knee osteoarthritis. In addition, this study provides evidence for the short-term effectiveness of the maitland mobilization technique at the knee joint in the management of knee osteoarthritis along with the exercise program. On comparison of both these techniques for their effectiveness, it was found that myofascial mobilization was more effective than maitland mobilization along with exercises program in reducing pain and improving functional activity in osteoarthritis of knee^[12].

The results in this study were incongruous with the randomized controlled trial carried out by Henry Pollard *et al*^[3] in 2008 to find out the effectiveness of myofascial mobilization and manipulation thrust technique in knee osteoarthritis and a significant decreases in the pain severity by mean of 1.9, however in the present study done by Nor Azlin and K. Su Lyn (2011) declared the effect of passive joint mobilization in osteoarthritis of the knee and found 44% reduction in mean VAS scores, similarly in a current study in pain reduction by 51.347% was observed for myofascial group and 48.0354% for maitland group^[13].

Further, the results of the present study goes in favour of the study done by G Deyle *et al.* in 2000 who demonstrated 56% of improvement in total WOMAC score after administering

manual physical therapy and exercise in osteoarthritis of the knee, however, in this study 56.35% and 52% improvement in WOMAC scores was noted in myofascial mobilization group and maitland group respectively. The result of this current study was comparable with the finding of the study done by Sambandam *et al.*, 2011^[6] on the effect of mulligan mobilization and maitland mobilization in patients with unilateral tibiofemoral osteoarthritis found that the mulligan mobilization technique is more effective than the maitland mobilization technique^[12, 13].

The result of our study demonstrated significant short-term efficacy of maitland mobilization in reducing pain by 52.32% and improving functional disability by 48.03% associated with knee osteoarthritis may be because of the mechanical force during mobilization may include breaking up of adhesion, realigning collagen, or increasing fibre glide when specific movement stress the specific parts of the capsule. Furthermore, these mobilization techniques are supposed to increase or maintain joint mobility by including biological changes in synovial fluid, and enhanced exchange. Maitland's mobilization mainly consists of rhythmic oscillatory movement which stimulates the type-2 dynamic mechanoreceptors and in this way can inhibit the type-4 nociceptive receptors and hence pain. Maitland rhythmic oscillation also has an effect on circulatory perfusion. The ongoing circulatory stasis may lead to ischemic and the potential for intraneural oedema, inflammation, and fibrosis. Mobilization has an effect on fluid flow as blood flow in the vessels supplying the nerve fibres and synovial fluid flow surrounding the avascular articular cartilage. This by a pressure gradient, is generated which helps in facilitating the exchange of fluid, that is, increased venous drainage and dispersing the chemical irritants. This causes a reversal of the ischemic, edema, and inflammation cycle and reduces joint effusion and relieves pain by reducing the pressure over the nerve endings^[14, 15].

Also, the present study explains the short-term efficacy of the myofascial mobilization technique derived from the Macquarie Injury Management Group Protocol (MIMG) in reducing pain and improving disability in patients with osteoarthritis knee [16, 17, 18].

MMIG consisted of a non-invasive myofascial mobilization. This mobilization procedure stretches the joint capsule in the sagittal plane, gently mobilizes any restriction to normal movement within the limits of the patient's tolerance and likely loosens adhesions within the joint. In addition, it may be used on anterior thigh musculature to effectively mobilise tight myofascial thigh structures. Together these effects allow the knee greater mobility with less effort, restriction and pain. An important aspect of the procedure is that participants are able to cease participation at any point during the application of the procedure or at any time during the experimentation, meaning it is performed voluntarily within their tolerance levels. This is an important first step in determining the limits to which force is used in the application of manual therapy. It provided direct feedback to the practitioner about the degree of stiffness limitations and pain present in the afflicted knee. It has become a useful addition to many techniques often used to treat knee dysfunction.²⁰ the second part of the MIMG technique including myofascial thrust manipulation was not included in the current study because it requires clinical expertise [19, 20, 21, 22].

Our study described the effectiveness of myofascial mobilization when compared to maitland mobilization in the management of knee osteoarthritis on a short-term basis i.e. after the end of 2 weeks of intervention including a standardized exercise program. Further research can be incorporated to investigate including standardized exercise programs. Further research can be incorporated to investigate the long-term results of such an intervention for osteoarthritis which is chronic in nature and uncertain.²² As this study proved the efficacy of each technique separately on a short-term basis, the combination therapy along with supervised exercises can be employed to demonstrate short-term and long-term effects to manage the osteoarthritis symptoms to delay or prevent the need for surgical intervention [23].

Similarly, both mobilization techniques used in this research demonstrated significant short-term relief of self-reported pain and dysfunction in participants with knee osteoarthritis. In addition, no participants in either group reported adverse effects/discomfort with the intervention. In light of these findings, it is recommended that further research be conducted to determine the utility of this protocol in patients not achieving satisfactory pain management with traditional approaches of exercises and medication for knee osteoarthritis [24].

Therefore it is suggested that the manual therapy technique myofascial mobilization and maitland mobilization should be added to our day-to-day clinical practice. Moreover, it is difficult to generalize the populations because the population in itself is a heterogeneous group and most of the available literature of studies on similar treatment methods or comparison types always face the problem of maintaining the homogeneity of the population. Therefore, studies can have higher or lower ranges.¹This is also to prove that the current study cannot be generalized because of the relatively different lifestyles, living standard work patterns and differing activities of daily living [20].

Limitation of study:

- Small sample size; making it difficult to generalize the effects of maitland mobilization and myofascial release technique for both the groups respectively.
- The exercise program used in this study was 6 weeks long, which is a relatively short amount of time, and therefore, the results of this study could not determine the long-term effects of the exercise.
- Only the myofascial part of the Macquarie injury management group knee protocol (MIMG) was used in the current study.

Recommendations for future research:

- Future research should seek to further identify osteoarthritis in the knee in asymptomatic or symptomatic subjects from various fields too.
- Future Research recommends the implementation of a more detailed objective screening process; one which includes a postural assessment, observation and measurement of dynamic knee positioning, soft-tissue mobility assessment, and knee muscle strength assessment.

Conclusion

The present study concludes that maitland mobilization alone and myofascial release technique along with the knee stabilisation exercises both were effective in reducing osteoarthritis of the knee. Both improved symmetry, muscle strength and reduced pain. Adding of myofascial release technique showed slightly better improvement in the kinematics of the knee joint along with muscle strength. It is recommended to consider both treatment strategies for patients with osteoarthritis of the knee.

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