ISSN Print: 2394-7500
ISSN Online: 2394-5869
Impact Factor: 8.4
IJAR 2023; 9(7): 175-177
www.allresearchjournal.com
Received: 11-03-2023
Accepted: 18-04-2023

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Immediate effect of instrument assisted soft tissue mobilization on quadriceps muscle on pain and functional mobility in OA knee patients

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DOI: https://doi.org/10.22271/allresearch.2023.v9.i7c.11103

Abstract
Aim: The aim of this study was to evaluate the immediate effect of instrument assisted soft tissue mobilization (IASTM) on quadriceps muscle on pain and functional mobility in patients with OA knee.
Subject and Method: 60 patients were selected who matched clinically diagnosed OA Knee Based on American College of Rheumatology criteria for OA knee the subjects were randomly assigned to the experiment group (N=30), which received strokes of IASTM while the control group (N=30) were made to lie down in the treatment position for approximately 10-15 minutes. The NPRS and Timed Up and Go Test was assessed pre and post treatment for both the groups.
Results: show there is clinically significant changes in pre and post comparison for experimental group whereas no significant changes are seen in control group.
Conclusion: IASTM improves functional mobility and pain in patients with grade 0-2 Osteoarthritis knee. Therefore, it can be used in conjunct to conventional physical therapy.

Keywords: Instrument assisted soft tissue mobilization, Quadriceps muscle, Osteoarthritis Knee

Introduction
OA knee which is characterized by loss of joint cartilage is not only the commonest cause of knee pain but also majorly affects the functional mobility of the person.
Knee OA is most likely to become the eighth most important global cause of disability in men and fourth most important in women [1]
Knee OA is most prevalent in people over the age of 45 and it`s attribution to pain and functional disability is 19.2-27.8% of the population [2].
Although the exact pathophysiology is not completely understood recent studies show that there have been discrepancies between the patient reported pain and radiographic findings in OA knee patients. This can be possibly explained by the numerous studies done on presence of Myofascial restriction in the muscles surrounding the knee eventually leading to decrease in function [3].
Having no known cure for OA knee patients usually adhere to medical interventions such as NSAIDs, inter-articular injections and eventually knee Arthroplasty. While the latter is invasive, other non-invasive treatment options such as mobility exercise and electrotherapeutic modalities have proven to decrease pain and improve function [4].
Dor and Kalichman (2017) observed that the underlying cause of increased pain and reduced functional mobility is the numerous trigger points present in the muscles around the knee joint. Hence, physical therapy treatment focusing on the trigger points in OA knee patients might be beneficial [3].
According to studies conducted by Sanchez-Romero and Pecos-Martin (2018) the prevalence of trigger points was found highest in quadriceps vast us medinalis (75.43%) and vast us lateralis (65.78%) muscle [5].
Moreover, IASTM is a kind of skilled intervention which is based on rationale by James Cyriax. IASTM uses specifically designed tools which have different edges that reduce manual labor (unlike cyriax) and in turn prove efficient. Hence, use of tool is advantageous over the use of the therapist's hands. IASTM produces localized inflammatory response, break the existing scar and reduces myofascial restrictions [6].

Hence, IASTM could be used as an adjunct to conventional therapy for patients to improve pain and function in chronic musculoskeletal conditions.

Therefore, the aim of this study was to explore the immediate effect of IASTM on quadriceps muscle on pain and functional mobility in OA knee patients.

Method

60 patients were selected for the study conducted at Bhausaheb Sardesai Talegoan Rural Hospital based on the following inclusion criteria- both male and female, meeting diagnosed OA Knee Based on American College of Rheumatology criteria for OA knee, between the age 45-70 years and grade of OA being 0-2. Exclusion criteria consists of RA or any other inflammatory conditions, any deformity of the lower limb, lesions or wound on the area of treatment, less than 6 months of intraarticular injections taken before the treatment and constant use of pain medications.

After the approval of Institutional Ethical Committee, written informed consent was taken from all the 60 subjects and were divided in two groups by chit method of random sampling. Subjects within experimental group were given strokes of IASTM with the M2T blade with prior application of hypoallergenic cream to the treatment area. The therapist stands beside the patient at waist level. The therapist with appropriate grip of the tool applies uniform strokes to the muscle belly of quadriceps muscle maintaining uniform pressure throughout.

Approximately 7-10 strokes are applied to each area in a uniform manner. The patients of the control group were made to lie in the treatment position for same time as that of the actual treatment time for around 10 minutes.

Outcome was measured before intervention and immediately post treatment by TUG for functional mobility and NPRS scale for pain intensity.

Results

Descriptive statistics was done in the form of mean and standard deviation. Interferential statistics evaluated changes in the NPRS using Mann-Whitney test between the groups and Wilcoxon matched pairs test was used to measure changes within groups, while changes in TUG were evaluated using Paired t test and unpaired t test in both control and experimental group. Data analysis was done using in stat (Version 3.05, created September 2000). Significance was accepted with $p<0.05$

Study shows significant difference in NPRS of experimental group with mean difference 1.1±0.71 at p=0.00001, while that of control group 0.4±0.2 at P=0.05 and U=144.

Study showed extremely significant difference in TUG of experimental group with mean difference 1.82±0.5 and P Value = 0.05, while significant difference in pain scale of control group with mean difference of 0.46±0.87 and P Value = 0.0001, with U = 20.

Table 1: Effect of IASTM on NPRS on Group A and Group B taken Pre and Post

NPRS		PRE (Mean ± SD)	POST (Mean ± SD)	P-Value	Significance
	Group A	6.36±1.67	5.3±2.42	< 0.00001	Significant
	Group B	6±1.87	5.8±1.95	< .05	Significant

Intragroup Comparison of NPRS

Table 2: Effect of IASTM on TUG on Group A and Group B taken Pre and Post

Timed Up & Go		PRE (Mean ± SD)	POST (Mean ± SD)	P-Value	Significance
	Group A	16.26±2.66	14.44±2.52	< 0.5	Significant
	Group B	18.42±2.66	18.24±3.41	< 0.5	Not significant

Intragroup Comparison of TUG

Table 3: Intergroup effect of IASTM on NPRS

Outcome Measure	Group A Mean difference (SD)	Group B Mean difference (SD)	P Value	Significance	Mann-Whitney U
NPRS	1.1±0.71	0.4±0.2	< 0.00001	Significant	144

Intergroup Comparison of NPRS

Table 4: Intergroup effect of IASTM on TUG

Outcome Measure	Group A Mean difference (SD)	Group B Mean difference (SD)	P Value	Significance	Mann-Whitney U
TUG	1.82±0.5	0.46±0.87	< 0.05	Significant	20

Intergroup Comparison of TUG

Discussion and Conclusion

This study was done to find the immediate effects of Instrument assisted Soft Tissue Mobilization on the Quadriceps muscle on Pain and functional mobility on patients with grade 0-2 Osteoarthritis with no history of intra articular injection in the recent 6 months along with no constant use of pain medications. The age of the subject participated was between 45-70 years. A total of 60 subjects participated in this study. Dividing them randomly into group A and group B of 30 each.

The results showed significant changes on Group A immediately post one session of IASTM indicating its clinical significance. Thus this study has through its results shown that IASTM has immediate effects on pain and functional mobility.

Reduction in pain might be explained by a study done by Macdonald and Baker that say that Application of IASTM is theorized to stimulate connective tissue remodeling through resorption of excessive fibrosis, along with inducing repair and regeneration of collagen secondary to fibroblast recruitment. In turn, this may result in breakdown of scar tissue, the release of adhesions, and improvement in fascial restrictions. Study done by Seffrin and Cattano (2019) depicts that IASTM is beneficial for increasing ROM and for improving pain and patient-reported function in patients.

Reduction in pain and increased functional mobility can be attributed to the reason that IASTM is based on the principles of Cyriax. IASTM produces micro trauma to the adherent tissue causing rupture of capillaries leading to acceleration of healing process. This also increases the vascular supply to the tissue. This is succeeded by collagen synthesis and tissue maturation. Increased blood flow to the tissue also leads to exchange of waste metabolites that in turn leads to reduction in pain.

This study establishes that IASTM has an immediate effect on pain and functional mobility in patients with grade 0-2 OA knee. Hence, focus needs to be brought on the treatment of Trigger points and myofascial adhesions in patients with OA knee to bring in early stages of rehabilitation. This method is also advantageous as it is non-invasive and also easy to administer. Its additional benefit being that it provides mechanical advantage to the therapist and reduces manual labour.

Thus IASTM can be included in the conventional physical therapy programs in patients with OA knee.

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