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Effectiveness of Instrument Assisted Soft Tissue Mobilization Technique on Hamstring Flexibility in Patients with Knee Osteoarthritis – A Non-Randomized Trial

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ABSTRACT

Background: Osteoarthritis is a common prevalent rheumatic disease which can lead to pain, decrease in range of motion and disability. Hamstring muscles can also effect the knee joint in such conditions which need to be focused. **Objective:** To determine the effectiveness of instrument Assisted soft Tissue Mobilization Technique on Hamstring Flexibility in Patients with Knee Osteoarthritis. **Study Design:** Non-Randomized Trial. **Settings:** The data was collected from Reactive Physio Lahore Pakistan. **Duration:** The study was conducted from December 2021 to March 2022. **Methods:** By using simple Convenient Method 36 patients was considered for the conduction of this study. Subjects diagnosed with Osteoarthritis grade II and III were included as per inclusion criteria and then divided in two groups with 18 subjects in each, where Group A was given IASTM and B was given bent leg raise. Pain was measured using Numeric pain rating and Range of Motion was measured using goniometer, Physical function using WOMAC items and Active knee extension for hamstring flexibility. The outcomes were assessed before and after 8 weeks of intervention. The data was distributed normally, Pair sample test was used for with group and independent t- test was used for between group analyses of outcome of interest. **Results:** The study comprised of 36 subjects in both groups. There were 22 males and 14 females with a mean age of 53.18 ± 5.90. The mean pain score in experimental group A was 7.72 ± 0.95 and reduced to 2.50 ± 1.33 after 8 weeks of intervention compared to 7.50 ± 1.04 to 3.67 ± 1.78 in control group (B) While Knee flexion in A was B 79.72 ± 5.80 to 94.74 ± 4.36 in experimental group compared to group B 77.22 ± 5.74 to 89.17 ± 7.12. Between the group using independent sample T-test showing dominant effects of IASTM (group A) compared to group with a p value = <0.05. **Conclusion:** The study resulted that IASTM had significant effects on improving Pain, Function and ROM in patients with Knee OA.

Keywords: *IASTM, Exercise, Knee Osteoarthritis, Pain, Physical function, Range of motion.*

INTRODUCTION

Osteoarthritis is a most prevalent among the chronic rheumatic diseases, most commonly effecting women more than that of females leading to disability. Overall, it was 28.7% and female prevalence was 31.6%.[1] There are near to 13% of the females and males aged 60 years have 10% and older have symptomatic knee OA. The ratio of the population affected from the OA with symptoms in knee most likely to be increased because of the age related of that population and their ratio of obesity / overweight in comparison to the general ones women[2] especially those of above 55 years, have more severe OA in the knee as compared to the other joints of body. The postmenopausal factors and gender differences effects the prevalence of OA in knee joint.[3]

The incidence found to be investigated knee OA on the basis of radiographic evaluation of the bone has been investigated in aged above than 60 years of age. The incidence was more in females than that of the males of same age.[4] Knee arthritic symptoms were mostly in the general young was less but mostly found in women of older age. In a study Greece community, knee OA symptoms reported and incidence were very high in the females than that of males and ratio was increased significantly with respect to age.[5] The symptoms leading to concerns of Knee arthritis are Higher Body Mass Index, less education, increase in morbidity, activity limitations and joint space tenderness. All these can lead to increase in pain and limitation in activities of daily living.[6]

There is need to improve the flexibility of hamstring that can improve the knee functions. Its flexibility can be increased using PNF stretching techniques, said to be more effective than static exercise.[7] IASTM has been used in couple of years for increasing the flexibility of muscles.[8] IASTM has a specific protocol which added with exercise therapy and significant effects are produced.[9]

Different studies addressed flexibility of Hamstring using PNF, stretching exercise, mobilization techniques but lack of study addressing IASTM in Pakistan for improving Hamstring flexibility. The purpose of this study was to measure the effects IASTM Technique in patients with knee osteoarthritis having restricted hamstring flexibility. So that they can be given new strategy to live an improved activity of daily livings with decrease in symptoms due to knee Osteoarthritis.

METHODS

This was non-randomized controlled trail. This study was conducted after ethical approval from Azra Naheed Medical College Lahore. (SU/ANCRD/IERC/145) After the ethical Approval study was conducted from October 2021 to March 2022. Sample was n=38 patients were considered for the conduction of this study.[10]

Before the start of their participation in the study, all the participants were informed about the study and its purpose. After their signed consent they were allowed to participate in the study. Subjects having Knee osteoarthritis patients with medial joint space reduction with osteoarthritis between 40-60 years of age at hospital were studied. Clinically and radiological based diagnosed cases of medial compartment knee OA grade II and III. The Subjects of both gender male and female with Osteoarthritis of Grade II and III (based on Lawrence Kellgren Criteria of Radiological classification of Knee OA)[11] were included having limitation in their Hamstring flexibility (Range of Motion) less than 100-20 Degrees. While diabetic, any sensitivity to skin, allergy, acute injury, osteoporosis, neurological conditions etc. were excluded.[12]

We enrolled 44 subjects in the study following inclusion and exclusion criteria settled for study. In the first step participant were selected through non- purposive convenient sampling. After baseline evaluation of the subjects by a blind assessor the subjects were allocated to Group A (Experimental) and Group B (Routine Physical Therapy). In Group A IASTM was applied on Hamstring muscles with a standard protocol of examination, warm up, IASTM, stretching, strengthening and icing.[13] In group B we used Bent Leg Raise with three repetitions as per rule of Brain Mulligan joint Mobilization with Movement concept (MWM).[14]

The subjects were asked to lie supine and therapist standing and involved knee on the shoulder of therapist, the subjects were asked to push their hip down like pressing the shoulder of therapist down. Then sustained hamstrings submaximal isometric contraction maintained for not less than 5-10 seconds. The leg is gain taken to resting position and started again with gained range.[15] The subjects were given a total of 3 sessions /week with total number 12 sessions in every participant.[16]

WOMAC items of Physical function was used for physical function[17] The ROM was measured using goniometer which showed a good intrarater reliability of 0.998[18] Active knee extension test (AKE) was performed in position of knee and hip flexion which is mostly used for hamstring flexibility in patients having restricted joint flexibility. It has intrarater reliability of 0.882.[19]

Data was taken at baseline and after 8 weeks of intervention. The results of study presented as, mean ±SD and p-value. The intervention period for each patient was 8 weeks and data was collected on 1st day (baseline) and at the end 8th week by independent assessor. Two patients were excluded from analysis, they had withdrawn from the study. The data was analyzed using SPSS version 25. After normality tests, the distribution was about normal. The analysis within the group's pair t test was used and for between groups independent sample t-test and was used. The data was analyzed on keeping P value <0.05 as significant.

RESULTS

The study comprised of 36 subjects in both groups. There were 10 males and 08 females in experimental (IASTM) Group with a mean age of 53.18 ± 5.90 (Table 1)

The mean pain score in experimental group was 7.72 ± 0.95 and reduced to 2.50 ± 1.33 after 8 weeks of intervention compared to 7.50 ± 1.04 to 3.67 ± 1.78 in control group (B). In Group A Knee ROM was improved

from 79.72 ± 5.80 to 94.74 ± 4.36 while physical functions was improved from 54.0 ± 48.33 and AKE was 38.61 ± 10.38, showing a significant improvement in experimental group. The p value was <.05 showing significant effects of IASTM. (Table 2)

Table 1: Participants Profile

	Categories	Male (N=18)	Females (N=18)
		Experimental	Control
Gender	**Male**	**10**	12
	Females	8	6
Socioeconomic status	**Upper Class**	**06**	**04**
	Middle Class	**9**	**12**
	Lower Class	**3**	**02**
Body Mass Index	**Underweight**	**06**	**05**
	Normal	**04**	**08**
	Overweight	**06**	**4**
	Obese	**02**	**01**
Mean age	53.18 ± 5.90.		

Table 2: Within Group comparison of outcomes

Outcomes	Evaluation	Experimental group (A) (N=18)			Control group (B) (N=18)		
		Mean	SD	P-value	Mean	SD	P-value
Numeric Pain Rating	**Baseline**	7.72	.95	0.00	7.50	1.04	0.00
	After 8 weeks	2.50	1.33		3.67	1.78	
Knee Flexion	**Baseline**	79.72	5.80	0.00	77.22	5.74	0.00
	After 8 weeks	94.74	4.36		89.17	7.12	
WOMAC-Physical Function	**Baseline**	54.00	4.36	.01	53.00	3.85	0.00
	After 8 weeks	48.33	6.13		39.44	7.37	
Active Knee extension (AKE)	**Baseline**	38.61	1.68	0.00	38.00	2.78	0.00
	After 8 weeks	10.38	31.61		15.61	1.78	

Between the group using independent sample T-test stated that a mean difference of 1.16 for pain, Knee flexion 2.50, physical function -8.88 and AKE was 5.22 showing dominant effects of IASTM (group A) compared to group B. (Table 3)

Table 3: Between group comparisons of outcomes

Outcome Evaluation	Evaluation	Mean	Std. Error	P-value
Numeric Pain Rating	**Baseline**	-.22	0.33	.51
	After 8 weeks	1.16	0.52	.03
Knee Flexion Range	**Baseline**	2.50	1.92	.20
	After 8 weeks	5.55	1.96	.00
WOMAC-Physical Function	**Baseline**	-1.00	1.37	.47
	After 8 weeks	-8.88	2.26	.00
Active Knee Extension	**Baseline**	-0.61	0.76	.43
	After 8 weeks	5.22	0.56	00

DISCUSSION

This NRCT was conducted **a**fter the ethical Approval on December 2021 to march 2022 as per approval Institutional Review Board. By using simple convenient method 36 patients was considered for the conduction of this study determine the effectiveness of instrument Assisted soft Tissue Mobilization Technique. Between the group comparison showing dominant effects of IASTM group A compared to group B with a p value <0.05. The study resulted that IASTM had significant effects on improving Pain, Function and ROM in patients with Knee OA. Another study conducted on Cupping compared to IASTM for pain, ROM and reach of the patients. The study concluded even a single session had improved hamstring flexibility without any additional intervention.[20] In our study mean pain score in experimental group was 7.72 ± 0.95 and reduced to 2.50 ± 1.33 after 8 weeks of intervention with a p-value of <.05. The p value was <.05 showing significant effects of IASTM. Another study has stated that PNF and IASTM than the static loading in improving Hamstring flexibility. These both were found alternatives in betterment of flexibility of hamstring with a short time compared to stretching exercises.[21]

In another study, there was significant increase in pre and post intervention immediately and after 48 hours of IASTM and Roller massage was evident with a p-value <.05. But this study was also limited to small sample size.[22] In our study between the group using independent sample T-test stated that a mean difference for pain, Knee flexion 2 physical function - and AKE w showing dominant effects of IASTM compared to bent leg raise.

In our study mean pain score, Physical function active knee extension was reduced showing the hamstring flexibility has been increased compared to baseline showing a significant improvement in experimental

group. The p value was <0.05 showing significant effects of both techniques but dominant effects of IASTM compared to group B. Another cross over study suggested that IASTM and massage can be used clinical for improving hamstring flexibility and a change of 10 degree was noted as an immediate response using both interventions.[23] Stationery and movement cupping has also positive impact on pain, ROM and tightness with significant effects on hamstring flexibility that can improve the movements at Knee joint.[24] Comparing to these studies the IASTM was found equally effective but immediate progress in rehabilitation can be with promising results in improving activity of daily living.

CONCLUSION

The study concluded that the IASTM had significant impact on Pain, ROM and Physical function for improving Hamstring flexibility among patients with knee Osteoarthritis to a level that can affect their ADLs towards improvement.

LIMITATIONS

The study was conducted on fewer samples and focused only short-term effects with non–randomization.

SUGGESTIONS / RECOMMENDATIONS

Such studies should be continued at larger samples, so that results can be generalized in other populations as well and regions to rule out if there are others factors affect the outcomes.

CONFLICT OF INTEREST / DISCLOSURE

None declared.

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