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Tit comparative effects of mulligan traction straight leg raise versus muscle energy technique on pain intensity and hamstring tightness in patient with knee osteoarthritis

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***Abstract*---**Objective: To determine the comparative effects of mulligan traction straight leg raise versus muscle energy technique on pain intensity and hamstring tightness in patient with knee osteoarthritis. Methodology: The design of this study was randomized clinical trial. Data was collected from Physiotherapy Clinics, the University of Faisalabad. The sample size was of 36 subjects. Informed consent was signed by all participants. Participants were included in study by considering inclusion and exclusion criteria. Subjects were divided randomly by lottery method into two groups, group A (mulligan traction straight legs raise technique) and group B (Muscle energy technique). Total treatment was of 4 weeks. Outcomes measures tool were, VAS (visual analogue scale) for pain intensity and Oxford knee score (OKS) for disability. Active Knee Extension test was used to assess hamstring flexibility. Results: Mean Age of the group A

participants were 53.89±5.76 and group B age 56.39±5.78. MET group was more effective in improving knee function rather that mulligan group (42.6±4.3 vs 34.3±5.1 with p value .000) similarly. MET group was more effective in improving hamstring flexibility and in pain reduction her that mulligan group (17.1±3.6 vs 24.6±4.7 with p value .000; 1.4±.5 vs3.4±.8 with p value .000). Conclusion: Muscle Energy Technique was more effective in improving hamstring flexibility, reducing pain and decrease functional disability in patient with knee Osteoarthritis.

***Keywords*---**muscle energy technique, knee osteoarthritis, hamstring tightness, pain intensity.

Introduction

Osteoarthritis is defined as it is the type of joint disease which is caused by cartilage degradation. Aging, heredity, and injury from trauma or disease can also contribute in osteoarthritis. The most common form of the arthritis is knee osteoarthritis (OA), in older adults and sometimes in young patients it is the most single important cause of disability. First, the synovium and also the cartilage and bone are involved in pathological processes that can lead to advanced joint degeneration. [1] Symptomatic knee OA affects at the age of 60 years or above, about 10% in men and about 13% of women. [2] Males at the age 55 years had a lower occurrence of knee OA than females. Females, particularly those over 55, had more worsen condition OA in the knee, but OA did not affect their other joints. Frequent knee pain affects approximately 25% of adults, and OA is the most common cause of knee pain in people older than 50 yearsThe findings of this study revealed a sex difference in the occurrence of knee OA, particularly after menopause. [3]

Pain and stiffness are the main symptoms of osteoarthritis in the affected joints. The pain can be worsening at the end of the day when moving the joint. After rest joints may feel stiff, but this usually wears off properly quickly once get moving. Sometimes swelling may be seen in affected joints. The joint cannot move freely or as far as normal, and it may make crackling sounds when moving the joint. This sound is called as crepitus. [4] Physical findings of arthritic joints include bony enlargement, crepitus, cool effusions, and decreased range of motion. Tenderness on palpation at the joint line and pain on passive motion are also common in OA. Physical findings of arthritic joints include bony enlargement, crepitus, cool effusions, and decreased range of motion. Tenderness on palpation at the joint line and pain on passive motion are also common in OA.[5]

Hamstring muscle extensibility has an important role in knee osteoarthritis because it maintained the articular structure of joints. Pain in OA compromised the hamstring length result in reduction in knee movement it can also provide help in formation of contracture as a result hamstring length is affected. [6,7] There are several treatment alternatives available, and a patient might need to explore a few different ones before settling on the best one but in non-operative management of knee OA include heat and cold therapy. [8]

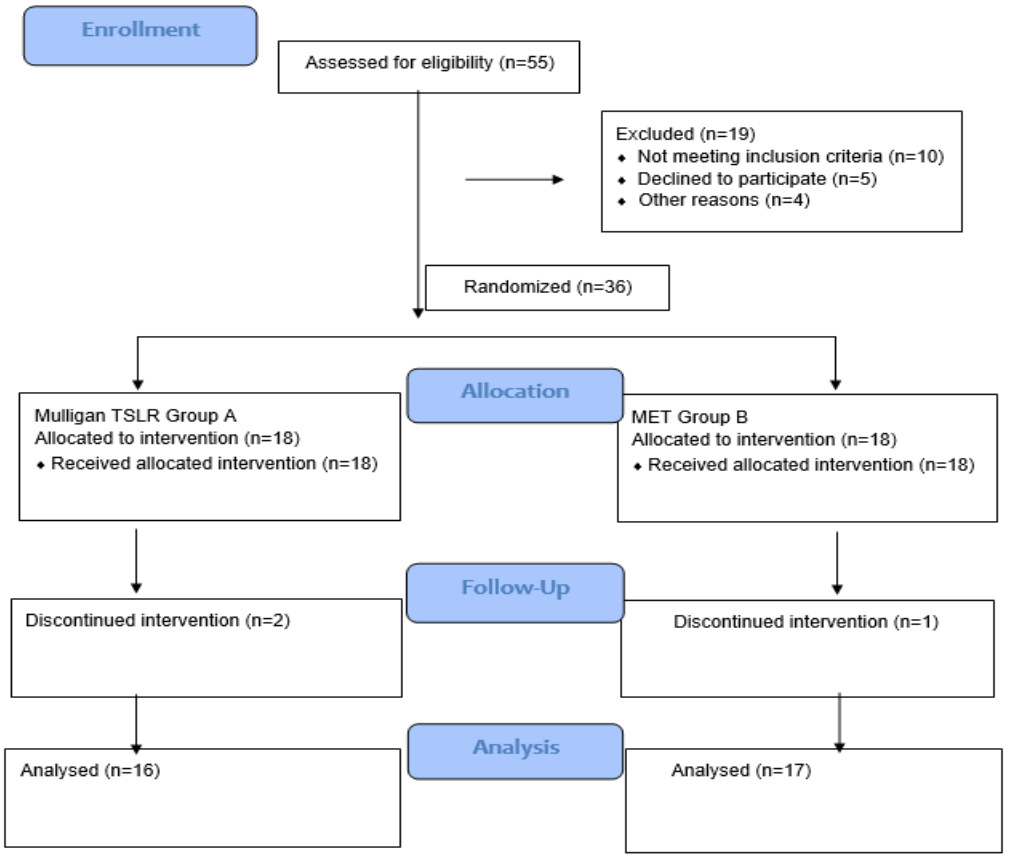
The Mulligan Traction Straight Leg Raise Treatment (TSLR) is an efficient technique invented by Dr. Brain R Mulligan that is considered painless and can be applied in any patient with hamstring shortening, back ache, knee pain, and painful or restricted straight leg raises.[9] The Muscle Energy Technique (MET) is a type of manual therapy that relaxes and lengthens muscles while also restoring joint mobility by using muscle contraction slightly.[10]

Literature support a lot of interventional options for the reduction of pain and increase hamstring muscle flexibility in patient with knee OA, but highlighting on mulligan traction straight leg raise Technique versus muscle energy technique yet not to be documented. So this study was conducted to investigate the effects of Mulligan Traction SLR and MET in Patient with Knee osteoarthritis. Patient suffering from Grade 1 and Grade 2 were the participants in this study so the effort of this study was to early diagnose and treatment to prevent disabilities.

Material and Methodology

This study was a randomized clinical trial with Single blinded in which patient was blind. Permission for data collection was approved from the ethical committee of University of Faisalabad. The duration of the study was 4 months after the approval of synopsis. Data was collected from the Physiotherapy Clinics, the University of Faisalabad by using purposive sampling technique. After conveying complete procedure of the study consent form was signed by each participant. A sample size of 36 was calculated by using online sample size generator Epi tool. [11] Participants were allocated into two groups by simple randomization using the lottery method. Group A was treated by Mulligan traction straight leg raise technique and group B was treated by Muscle Energy Technique. Inclusion Criteria of study was such as both male and female, Patients diagnosed with knee osteoarthritis grade 1 and grade 2, with the radiographic evidence as Kellgren-Lawrence criteria of knee osteoarthritis. Aging between 40 to 65years.[12] Subject shows more than mild pain on VAS, Patient more than mild disability in OKS. Unilateral involvement, Can walk without any assistive device e.g. crutches or walk helplessly. Patients who was willing to participate. At least can climb and incline the flight of stairs. Patient who quit all pain killers and muscle relaxant medication. Exclusion Criteria of study was i.e. Pregnancy, the participant with diagnosed musculoskeletal disorders related to knee joint e.g. femoral-patellar syndrome. Patients with surgical history of lower limbs/spine, Patients with pathologies or any deformity of hip joint/spine, Patient with neurological disorder for example Alzheimer's disease, Participants who were refusing to consent, Fracture. Moist hot pack and tens was provided as baseline treatment for 10 minutes to both groups. Group A was treated by Mulligan traction straight leg raise.[13] Group B was treated by Muscle energy technique (MET). By using 20% of their total strength withhold of 5 second participants perform isometric contraction and rest for 3-5 seconds between each isometric contraction. This group MET protocol consists of 2 sets of 10 repetitions per session. [14] The visual analogue scale [15] and Active Knee Extension test [16] were used as an outcome measure tools and were taken at the baseline and then after 2nd week and last reading was taken after 12th session at 4th week but Oxford knee Score [17] was taken at baseline and post treatment.

All data was analyzed by SPSS 23. Mean and Standard Deviation was calculated by using descriptive statistics. Repeated measure ANOVA was used for AKE test, pair t test was used for OKS and Fried man Anova was used for visual analogue scale to determine the inter group comparison between baseline and post intervention data. Independent t test for OKS and AKE T and main Whitney test was used between group comparisons. P value ≤ 0.05 was consider as a significant



Results

Both groups contained 18 participants. Group A includes 15 female patients (83.3%) and 3 male patients (16.7%). Similarly, group B includes 13 female patients (72.2%) and 5 male patients (27.8%). Mean of age was 53.89±5.76 in group 1. Mean of height and weight was 162.50±8.87 and 89.00±14.83. Mean of BMI was 34.52±5.850. While in group B mean age was of 56.39±5.78. Mean height of 161.50±9.91 and mean weight of 88.22±13.47. BMI with mean value of 33.86±4.57. Table 1

Pair t-test for baseline OKS and post treatment OKS within group A and group B participant was applied. Pair 1 compares baseline OKS and post treatment OKS within group A and Group B Results shows that in group A and group B mean

value of OKS at baseline was 23.4±6.9 and 23.06±4.43, at post treatment mean value was 34.31 ±5.1 and 42.65±2.31 with p-value 0.000 which reveals that there was statistically significant difference in OKS mean value after treatment session within group A and group B participants. Table 2 repeated measures Anova test was applied on AKE test score within Group A and Group B subjects. Subject AKE test mean value for group A and group B at baseline 55.8±2.1, 56.0±2.4 that was reduced to 24.6±4.7, 17.1±3.6 after end of 4 week of treatment within group A and group B subjects. P value was .000 that indicated there was significant difference in AKE test mean value with in group A and B group subjects. Table 2

P value was .000 for OKS and AKE at post treatment session for both groups by independent t test which reveals that there is statistically significant difference between mulligan and MET group. Mean value of OKS was significantly increased and AKE test mean value was more reduced in group MET at post treatment session as compared to group mulligan group which reveals that MET is more effective in improving hamstring flexibility and knee function among patients with osteoarthritis. Table 3

Friedman Anova test for Visual Analogue Scale (VAS) within group A and group B subjects was used. Results shows that mean value for group A and B of VAS at baseline was 6.1±1.258, 6.0±1.144 reduced to 3.4±.814, 1.4±.507 after application of mulligan technique and MET at post treatment session. This reduction of mean value of VAS reveals that pain was significantly reduced in group A and group B (P=.000). When comparing the post values of both groups by man Whitney test it is evident that Muscle Energy Technique has shown a greater improvement as compared to Mulligan Traction Straight Leg Raise group with a p value of (0.000). Table 4

Table 1 Demographic characteristic of Both Groups

Groups	Variable	Minimum	Maximus	Mean&S.D
Group A	Age of the Patients	45	64	53.89±5.76
	Height of the Patients	151.00	182.00	162.50±8.87
	Weight of the Patients	69.00	115.00	89.00±14.83
	BMI of the Patients	24.20	44.9.	34.52±5.85
Group B	Age of the Patients	47	65	56.39±5.78
	Height of the Patients	153.00	184.00	161.50±9.91
	Weight of the Patients	67.00	116.00	88.22±13.47
	BMI of the Patients	26.80	40.60	33.86±4.57

Table 2: Comparison of mean values of OKS with in groups A and Group B participants

	Variables	N	Mean&S.D	P value
Pair 1 Group A	Baseline OKS	16	23.4±6.9	0.000
	Post treatment OKS	16	34.3±5.1	
Pair 1 Group B	Baseline OKS	17	23.06±4.43	0.000
	Post Treatment OKS	17	42.65±2.31	
Group A	Baseline Reading of AKE	16	55.8±2.1	.000
	2nd Week AKE	16	41.2±3.3	.000
	Post treatment AKE	16	24.6±4.7	.000
Group B	Baseline Reading of AKE	17	56.0±2.4	.000
	2nd Week AKE	17	31.9±4.5	.000
	Post treatment AKE	17	17.1±3.6	.000

Table 3: Independent Sample t-test for comparison of mean value of OKS between two groups

	Group Of Patient	N	Mean	P value
Baseline OKS	Mulligan group	18	22.7±7.3	.891
	MET	18	23.0±4.3	
Post Treatment OKS	Mulligan group	16	34.3±5.1	.000
	MET	17	42.6±2.3	
Baseline AKE	mulligan group	18	56.0±2.0	.941
	MET	18	56.0±2.3	
Post treatment AKE	mulligan group	16	24.6±4.7	.000
	MET	17	17.1±3.6	

Table 4: Comparison of VAS value in group A and B

	Treatment group	N	Mean&S.D	Freidman Anova Within group P value	Sum of Rank	Between group P value
Baseline	Mulligan	16	6.1±1.2	0.000	342.50	.753
	Met	17	6.0±1.1		323.50	
Post treatment	Mulligan	16	3.4±.8	0.000	404.50	.000
	Met	17	1.4±.5		156.50	

Discussion

This study stated that both treatment techniques were affected in improving hamstring flexibility and in reduction of pain in patient who were suffering from knee osteoarthritis (grade 1 and 2) but Muscle Energy technique was more effected in reducing the pain and increasing hamstring flexibility as statistical mean were present. This result were also supported by previous literature. In a randomized control experimental study, was conducted on a sample size of 20 healthy male's age between 18-26 years with hamstring tightness this study concluded that Muscle energy technique show more effectiveness ($P<0.001$) then dynamic stretching ($p<0.02$) in improving hamstring flexibility.[18] This current study support the above study results in which muscle energy technique was also shows positive effects in improving flexibility in hamstring muscles rather than mulligan bend leg raise technique.

This study was conducted to compare two techniques in improving hamstring muscle flexibility. 40 individuals who were suffering from hamstring tightness. Participants was treated by Muscle Energy Technique and post Isometric Relaxation technique for consecutive 5 days. Active Knee Extension test were performed before and after treatment and reading were noted with help of goniometer. The results of this study shows that Among groups evaluation proven that Popliteal angle improved significantly in the muscle energy technique group as compared to PIR group ($p<0.05$). It is concluded that both techniques were effective in improving hamstring flexibility but muscle energy technique was more effective in improving hamstring flexibility.[19] This present study results was consistent with above study results exhibited that muscles energy technique was also effectives in reducing tightness in hamstring muscles ($p=.000$) but present study involve osteoarthritis participants.

This experimental study is based on 30 healthy collegiate athletes with hamstring discomfort were divided into two study groups at random. Muscle energy technique (Isometric contraction - employing post isometric relaxation, roughly 30% of patient's strength, 20 second contraction) was used on Group A (n=15) individuals, Other group-B (n=15) received static passive stretching (no warm-up allowed prior to stretching, Subjects received three 60-second stretches) while group-A (n=15) received dynamic passive stretching (no warm-up allowed prior to stretching, Subjects received three 60-second stretches). The treatment lasted one

day. This study stated that Muscle energy technique was more effective for enhancing hamstring muscle flexibility in Indian athletes than static passive stretching. This study could be expanded to include people of various ages, as well as follow-up to determine how long the results last.[20] This study findings were consisted with above this in which mulligan bent leg raise technique also reduced pain and reduced tightness in hamstring muscle. but population of this present study was osteoarthritis patients. This study is restricted by certain factors. First and main, study employed a comparatively small sample size of 36 participants which can disturb the validity and generalizability of results. Secondly, long term effects were not evaluated due to lack of time so it is not known whether the effect of treatment could be maintained for long period of time or not.

Conclusion

It is concluded that both Mulligan Traction Straight Leg Raise Technique and Muscle Energy technique were effective in improving hamstring flexibility and reducing pain intensity in patient with knee osteoarthritis. Both groups show better results in reducing functional disability in patient with knee Osteoarthritis. Although, Mulligan Traction Straight Leg Raise Technique was effective but Muscle Energy Technique was more effective in reducing pain, improving hamstring flexibility and reduce functional disability in patient with knee Osteoarthritis.

Recommendations

Based on our findings we recommend that following commendations should be endorsed by other researchers to further improve the quality of research.

- Further studies should be done on large sample size.
- Time duration of study should be increased for improved results
- Further studied can be done on knee osteoarthritis treatment using different pain reliving techniques and comparing them to check their efficacy.

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