



ORIGINAL RESEARCH PAPER

Physiotherapy

A COMPARATIVE STUDY OF MULLIGAN'S BENT LEG RAISE VERSUS MUSCLE ENERGY TECHNIQUE IN HAMSTRING TIGHTNESS OF ASYMPTOMATIC HEALTHY INDIVIDUALS

KEY WORDS: Hamstring tightness, Active knee extension test, Mulligan bent leg raise, Muscle energy technique

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ABSTRACT

Objective - The purpose of this study was to compare the efficacy of mulligan bent leg raise versus Muscle energy technique in hamstring tightness normal healthy subjects.

Method – The total 30 patients (female and male) were screened for this study. Subject should exhibit tight hamstring muscle and the hamstring tightness was determined by active knee extension test. 15 subjects were taken in each group. Group A(were treated with mulligan's bent leg raise stretching) and Group B(were treated with muscle energy technique) for duration of 3 weeks.

Result -Mulligan's bent leg raise and muscle energy technique of stretching of hamstring muscle both the intervention are effective in improving the hamstring flexibility, whereas Muscle energy technique is more effective as compared to mulligan's bent leg raise technique.

INTRODUCTION

Hamstrings tightness is common conditions found in both symptomatic and asymptomatic subjects (1).The hamstrings muscle is example of muscle group that have a tendency to shorten (2). The ability of an individual to move smoothly depends on his flexibility, an attribute that enhances both safety and optimal muscle activity.

"More efficiency and effectiveness in movement as a result of enhanced muscle flexibility will assist in preventing injuries and enhance performance. The length of a hamstring muscle is considered to play an important role in the both the effectiveness and the efficiency of basic human movements, such as walking and running. Short hamstring in patients with long standing disordered probably result from muscle and connective tissue shortening adaptation. Muscle extensibility is an essential element of biomechanical function.(3)

Decreased hamstring flexibility is suggested to be one of the predisposing factor for hamstring strains and hamstring stretches are routinely used as apart of preexercise routine, usually after an aerobic warm –up (4).

A short muscle is a musculotendinous unit that has a reduced capacity to be lengthened due to reduction in the number of sarcomeres in series, (5,6) or a reduction in the length or elasticity of the connective tissues. Physiological cause of reduced muscle extensibility relate to the contractility of the muscle cells.. Therapist incorporates various methods to improve the flexibility of musculotendinous structure of which stretching technique is very common and routinely performed. Any alteration in optimal length of hamstring muscle has significant changes in the posture hip and knee mobility and gait.

There are numerous ways to improve hamstrings tightness such as PNF, static stretching, mulligan's bent raise technique, muscle energy technique, ballistic stretching, ultrasound therapy and short wave diathermy along with stretching exercises.

Stretching is an effective means of treatment to improve the flexibility of the muscle. It is believed that with increase stretching over time the number of sarcomere is increased. In passive static straight leg raised stretch, the temporary gains in the ROM are attributed to temporary sarcomere or to connective tissue recovery from the creep response (7)

MATERIAL AND METHODOLOGY

STUDY SETTING

Data was collected from physiotherapy OPD of Subharti College of physiotherapy, SVSU Meerut

STUDY DURATION - 6 months

STUDY DESIGN - Pre-test and Post-test (experimental) design.

SAMPLING DESIGN- Randomized sampling

STUDY SAMPLE--The total 30 patients female and male were screened for this study by using inclusion and exclusion criteria. Selected 30 with the age group of 18-25 years met with established criteria and the study. They were randomly divided into group A (mulligan's bent leg raise) and group B (muscle energy technique).Subjects were made to sign an institution approved consent form their voluntary participation in this study. To participate in this study subject should exhibit tight hamstring muscle and the hamstring tightness was determined by active knee extension test. They were instructed to avoid to lower limb extremity exercise and not to increase the intensity or frequency of the activity during the study period.

INCLUSION CRITERIA

- Age - 18 to 25 years.
- Gender - both (Normal Healthy individuals.)
- Active knee extension test.
- Range greater than 20 degree.

EXCLUSION CRITERIA

- Low backache.
- Hamstring and strain.
- Knee joint flexion contractures.
- Any surgery around knee and hip joint.
- Soft tissue and bony pathology around lumber spine, hip knee region.

MATERIAL USED

- Moist heat pack.
- Universal Goniometer.
- Couch.
- Straps.
- Stop watch.
- Cross bar.

PROCEDURE :-

Ethical approval was obtained from the board of studies department of physiotherapy, swami vivekanand Subharti University. Subjects are randomly divided into two groups i.e., Group A and Group B. Each group will have 15 subjects.

Group A - Moist hot pack for 15 minute + mulligan's bent leg raise stretching for 30 sec/stretch, 3 stretches/ session/ day and 3 session/week for total duration of 3 week.

Group B - Moist hot pack for 15 minute +muscle energy technique for30 sec/stretch, 3 stretches/ session and 3 session week for total duration of 3 week.

Subjects were made to sign an institution approved consent form for their voluntary participation in this study. The hamstring tightness was determined by the active knee extension test. They were instructed to avoid lower limb exercise and not increase or frequency of the activity during study period.

DESCRIPTION OF MAIN OUTCOME MEASURE

Hamstring muscle flexibility of the right lower of each subject was measured prior or assigning to any groups. The anatomical landmarks hip flexion was greater trochanter, lateral condyle of femur, and the lateral malleolus of fibula. These landmarks were palpated with the subject positioned supine with the right hip and the knee flexed at 90°, and was marked with a marker for goniometric measurement.

To measure the knee range of motion in the experimental limb and to determining the hamstring flexibility, hip was placed at 90° of flexion. Then the subject were asked to move the leg actively to the terminal position of the Knee extension (maintaining contact of thigh with the cross-bar), which was defined as the point at which the subject felt discomfort or tightness in the hamstring muscle.

Once the terminal position was reached the measurement of the knee extension ROM was assessed with the goniometer and received and recorded. The measure knee extension ROM, fulcrum of goniometer was placed over the lateral epicondyle of femur. The proximal arm was aligned with the lateral midline of the femur, using greater trochanter for the reference and distal arm was aligned with the lateral midline of fibula, using the lateral malleolus and fibular head as reference, 180° degree was considered to be full extension. As the knee joint contractures were ruled out at the time of selection, the measurements of knee extension ROM.

Measurements were taken on the stretching lower extremity once a week during the stretching period.

BENT LEG RAISE (MULLIGAN'S) STRETCHING

A cross-bar was used in maintaining proper placement of the hip and thigh. The contra-lateral extremity was strapped down across the mid-thigh with the Knee fully extended and the hip in 0° of flexion, extension, abduction, and rotation. The therapist placed the subject's flexed knee over the therapist shoulder and asked the subject to push the therapist away with his/her leg. This counterforce should be maintained for 30 seconds and then relax for 10 seconds. At this point two more further stretches are given in the direction of the shoulder of the patient in the same way. This whole procedure is repeated for two more times.

MUSCLE ENERGY TECHNIQUE

The subject is made to lie on the couch in supine lying. The hip is passively flexed and the leg is extended until tension is sensed by the researcher and the subject reports a moderate stretching sensation. The participant is asked to provide a moderate knee flexion isometric contraction against the therapist shoulder for 7-10 sec, and this is followed by 2-3 sec relaxation and immediately after that the leg is passively stretched to the palpated barrier or tolerance to stretch and held for 30 seconds. The leg is then lowered to the table for a short resting period of 10 sec. This procedure is repeated for two more times.

DATA ANALYSIS

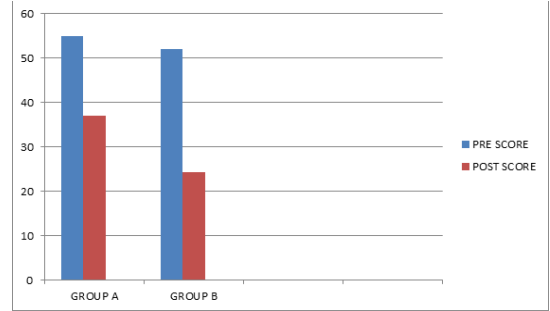
The collected data were tabulated and analyzed by using IBM SPSS version 20.0 software. Paired t- test was used to test the results between group A and group B.

RESULT

TABLE 1—MEAN & STANDARD DEVIATION OF ACTIVE KNEE EXTENSION PRE SCORE & POSTSCORE IN GROUP A & GROUP B FOR RIGHT SIDE.

S.NO.	TYPE OF GROUPS	MEAN±S.D.	
		PRE SCORE	POST SCORE
1	GROUP A	54.93#±6.34	37±6.76
2	GROUP B	52.±5.39	24.27±7.09

SHOWS LARGER VALUES IN THE CORRESPONDING GROUP.

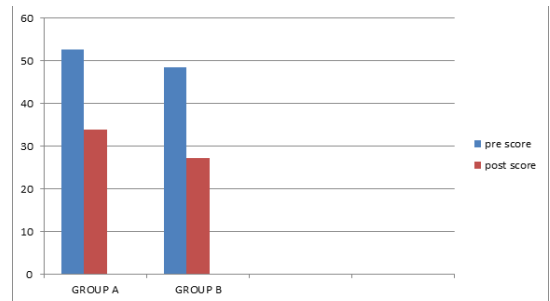


THE BAR DIAGRAM OF AVERAGE PRE & POST ACTIVE KNEE EXTENSION SCORES OF RIGHT SIDE IN GROUP A & GROUP B

TABLE 2—MEAN & STANDARD DEVIATION OF ACTIVE KNEE EXTENSION PRE SCORE & POST SCORE IN GROUP A& GROUP B FOR LEFT SIDE.

S.NO.	TYPE OF GROUPS	MEAN±S.D.	
		PRE SCORE	POST SCORE
1	GROUP A	52.67#±5.42	34±7.37
2	GROUP B	48.47*±6.61	27.2±8.08

SHOWS LARGER VALUES IN THE CORRESPONDING GROUP.

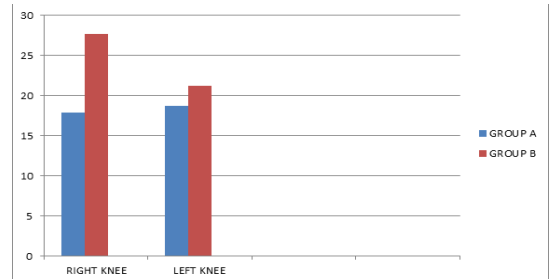


THE BAR DIAGRAM OF AVERAGE PRE & POST ACTIVE KNEE EXTENSION SCORES OF LEFT SIDE IN GROUP A & GROUP B

TABLE 3—MEAN & STANDARD DEVIATION OF DIFFERENCE IN ACTIVE KNEE EXTENSION PRE SCORE - POST SCORE IN GROUP A & GROUP B FOR RIGHT & LEFT SIDE.

S.NO.	TYPE OF GROUPS	MEAN±S.D.(DIFFERENCE B/W PRE TO POST SCORES)	
		RIGHT SIDE	LEFT SIDE
1	GROUP A	17.93±6.91	18.67*±7.61
2	GROUP B	27.33#±7.60	21.27±7.20

SHOWS LARGER VALUES IN THE CORRESPONDING GROUP.



GRAPH - THE BAR GRAPH DIAGRAM OF DIFFERENCE PRE TO POST SCORES IN RIGHT AND LEFT SIDES FOR TWO GROUPS

TABLE 4- % IMPROVEMENT B/W PRE TO POST ACTIVE KNEE EXTENSION SCORES FOR THE TWO GROUPS IN RIGHT & LEFT SIDE

S.NO.	TYPE OF GROUPS	MEAN±S.D.(% IMPROVEMENT BAY PRE - POST SCORES)	
		RIGHT SIDE	LEFT SIDE
1	GROUP A	32.39±11.21	35.20#±13.15
2	GROUP B	53.19*±13.01	44.03±15.20

SHOWS LARGER VALUES IN THE CORRESPONDING GROUP.

TABLE 5--COMPARISON B/W PRE TO POST ACTIVE KNEE EXTENSION SCORE DIFFERENCE IN RIGHT LEG & LEFT LEG FOR GROUP A & GROUP B

S. NO.	TYPES OF GROUP	PROBABILITY OF Paired" TEST B/W PRE TO POST SCORE DIFFERENCE IN RIGHT LEG	P -VALUE	PROBABILITY OF Paired" TEST B/W PRE TO POST SCORE DIFFERENCE IN LEFT LEG	P -VALUE
	GROUP A	.0000*	P<.05 (SIGNIFICANT)	.0000*	P<.05 (SIGNIFICANT)
1	GROUP B	.0000*	P<.05 (SIGNIFICANT)	.0000*	P<.05 (SIGNIFICANT)

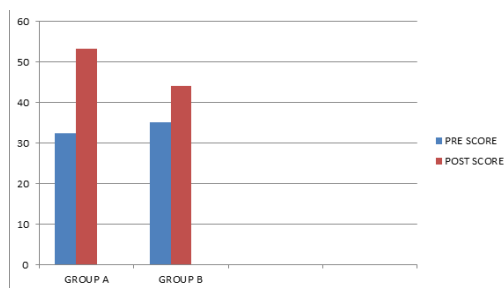
*SHOWS A SIGNIFICANT DIFFERENCE B/W PRE TO POST SCORES AT .05 LEVEL OF Significance<.05

TABLE 6-- COMPARISON B/W GROUP A & GROUP B FOR PRE ACTIVE KNEE EXTENSION SCORE AND POST ACTIVE KNEE EXTENSION SCORE IN RIGHT & LEFT LEG RESPECTIVELY(BY INDEPENDENT" TEST)

S.NO.	TYPES OF LEG	PROBABILITY OF Unpaired" TEST B/W GROUP A & GROUP B FOR PRE SCORE	P -VALUE	PROBABILITY OF Unpaired" TEST B/W GROUP A & GROUP B FOR POST SCORE	P -VALUE
1	RIGHT LEG	.1832**	p>.05 (N.S.)	.0000*	P<.05 (SIGNIFICANT)
2	LEFT LEG	.0678**	p>.05 (N.S.)	.0229*	P<.05 (SIGNIFICANT)

*SHOWS A SIGNIFICANT DIFFERENCE B/W PRE TO POST SCORES AT .05 LEVEL OF SIGNIFICANCEp<.05

**SHOWS NO SIGNIFICANT DIFFERENCE B/W PRE TO POST SCORES AT ,05 LEVEL OF Significance^ .05



GRAPH - THE BAR GRAPH DIAGRAM OF IMPROVEMENT IN % OF RIGHT AND LEFT SCORES OF GROUP A AND GROUP B

DISCUSSION

According to our study muscle energy stretching technique is more effective and better stretching technique than mulligan bent leg raise stretching.

And the findings are supported by the findings of Mohd Waseem et al that proved Muscle Energy Technique is significantly improving the hamstring flexibility (range of motion).

Our study showed a maintenance and perhaps an increase in Knee ROM can be gained if Muscle Energy Technique is continued. Our results also support the finding made by Ballantine F et al who found that Muscle energy technique produced an immediate increase in passive knee extension. They suggested that a single application of Muscle Energy Technique produced no biomechanical change to the muscle, but created a change in tolerance to stretch. Even though our study was done for period of 3 week but we did not study lasting viscoelastic changes. Thus future research can be done on the concept of visco-elasticity in relation to muscle physiology with application of Muscle Energy Technique. Our study also supports the finding made by Emad T. Ahmed at al. They found that Muscle Energy Technique is more effective than static stretching alone to improve a hamstring muscle flexibility post burn contracture. An increase in flexibility after muscle energy technique (MET) occurred due to biomechanical or neurophysiological changes or due to an increase in tolerance to stretching(8). Kuchera attributed the effectiveness of Mucle Energy Technique to the inhibitory Golgi tendon reflex(9). This reflex is believed to be activated during isometric contraction of muscles, which is claimed to produce a stretch on the Golgi tendon organs and a reflex relax-action of the muscle(10,11). Handel et al suggest that an increased stretch tolerance is a possible mechanism behind the increased ROM seen in their study after the contract-relax exercise program(12).

CONCLUSION

- Mulligan's bent leg raise and muscle energy technique of stretching of hamstring muscle both the intervention are effective in improving the hamstring flexibility.
- Muscle energy technique is more effective in improving the flexibility of hamstring muscle when compared to mulligan's bent leg raise technique over a period of 3 weeks.

LIMITATION OF THE STUDY

The study was limited to the effect of mulligan's bent leg raise and muscle energy technique on the hamstring of a relatively young sample.

The study did not include long term follow up or recurrence rate. Thus results cannot comment us about the effectiveness of both the intervention in long term.
Small sample size.

CLINICAL RELEVANCE

The use of either muscle energy or mulligan's bent leg raise stretching technique serves the purpose of increasing hamstring flexibility. In our experience, muscle energy technique is better as compared to mulligan's bent leg raise stretching technique to improve hamstring flexibility immediately after intervention and short term management.

FUTURE RESEARCH

Firstly the present study was limited to the relatively young male and female sample, therefore results and conclusion from this study are most applicable to the similar age group and gender.

Further result examining the effects of both muscle energy and Bent Leg Raise stretching methods on individuals in older age group and on male and female subjects would of interest. Secondly, this study did not include the group which received both the interventions. So there is little opportunity to comment about the effects of them together, therefore future research is required with these two stretching technique combined together on either lower extremity of the same individual. Conduct the study with large sample size.

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