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To compare the effectiveness of mulligan's bent leg raise and traction straight leg raise on hamstring flexibility in young individuals

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Abstract
The purpose of this study was to compare the effectiveness of Mulligan's bent leg and traction straight leg raise on hamstring flexibility in young adult population. A sample size of 60 among which there were 38 females and 22males. Group A(30subjects) received a single session of Mulligans Bent leg raise and Group B received a single session of Traction straight leg raise. (30subjects) Pre and post intervention readings were taken using Back savers sit and reach test. There was a significant difference in both the groups post intervention. However statistical comparison of the result showed that Group A had a greater improvement in the sit and reach score than Group B.

Keywords: hamstring, mulligan bent leg raise, traction straight leg raise, tightness

1. Introduction
The hamstring muscles comprises of three large muscles namely, semitendinosus and membranousus and biceps femoris muscles which originate from the ischial tuberosity.
They are located in the posterior compartment of the thigh and span the hip and the knee Joint. Hence they are extensors of the hip and flexors of the knee [1].
The word flexibility is derived from the Latin "Flectere" or "Flexibilis" which means "to Bend". It is defined as the ability to move a single joint or a series of joints smoothly and easily through an un-restricted, pain free ROM.
It is dependent upon the extensibility of a muscle which allows muscle crossing the joint to relax, lengthen and yield to a stretch force [2]. The Hamstrings muscles are important contributors to the control of human movement and are involved in a wide range of activities from running and jumping to forward bending during sitting or standing and a range of postural control actions [3] The flexibility of hamstrings provide for a functional mechanical advantage, while tight or shortened hamstrings adversely affect spinal mechanics [4]. Hamstring muscle is a postural muscle, and as it is bi-articular, it has a tendency to shorten even under normal circumstances. Tight hamstrings can cause your hips and pelvis to rotate back flattening the lower back leading to back problems [7]. The present study focuses on student population in the age group of 17 to 23 years as they have the posture of sitting with hip and knee flexion at 90º which predisposes them to hamstring tightness. In India occurrence of low back pain is also alarming, it has been reported to be 23.09% [8]. Half of the population will have experienced a significant incident of low back pain by the age of 30 years [9]. Based on the etiology LBP is classified as Specific LBP and Non-specific LBP. Of all the LBP patients 90% are attributed to Non-specific causes, a disorder which is a health problem of high economic importance [10]. Following are considered as risk factors for NSLBP: Poor Hamstrings muscular flexibility, Poor abdominal strength and Increased level of physical activity and work related postural stress [11]. Prevalence and incidences of Hamstrings tightness in non specific LBP individuals is high due to limited activity and lackof regular exercise.[12]Investigations suggest adequate flexibility of the Hamstring muscles is necessary for a healthy lower back [13].
Greater hamstring force is produced with the hip in flexion when the hamstrings are lengthening over that joint regardless of the knee position When the two-joint hamstring are required to contract with hip extended and the knee flexed to 90degree or more, the hamstring must shorten over both the hip and knee. The hamstring will weaken as knee flexion proceeds because not only are they approaching maximum shortening capability but also the muscle group must overcome the increasing tension in rectus femoris muscle that is approaching passive insufficiency [13].

2. Methodology
2(a) Purpose: The intention of the study was to compare the effectiveness of Mulligan's Bent leg raise and Traction straight leg raise technique on hamstring flexibility in young individuals.

2(b) Selection of the subjects: To achieve this purpose of the study 60 subjects both male and female between 18-25 years of age who were not involved in any sports or gymnasium activity were selected.

2(c) Procedure: Subjects were randomly divided into two groups; Group A received Mulligan's bent leg raise and Group B received Traction straight leg raise. (Single session)

Group A: (Mulligan's bent leg raise): This is a painless technique, when indicated, can be tried on any patient with

low back pain who has limited and/or painful straight leg raising (SLR). It can also be used in patients who have a gross bilateral limitation of straight leg raising. Position the patient in supine and place his flexed knee over your shoulder. Now ask the patient to push away with his leg and then relax. At this point push the patients bent knee up as far as possible in the direction of his shoulder on the same side provided there is no pain. Sustain this stretch for several seconds and then lower the leg to the bed. With the bent knee over the shoulder a traction component is included with this technique. Repeat 3 times.

Group B: (Traction straight leg raise): Position the patient in supine and stand facing his right side. Ask the patient to actively SLR without assistance and note the range. Now grasp his lower leg proximal to the ankle joint and raise it off the bed to a position just short of the painful range. Flex your knees and hold the clasped leg to your chest. When the therapist extends the knee this will effectively apply a longitudinal traction to the leg. Sustain the traction and undertake a straight leg raise as far as possible provided there is no pain. SLR with traction three times. (When pain free).

2(d) Findings: Pre and post analysis was done within group using paired t test which showed significant results.

Intragroup Comparisons

- **Back saver sit and reach score post bent leg raise**

For right leg

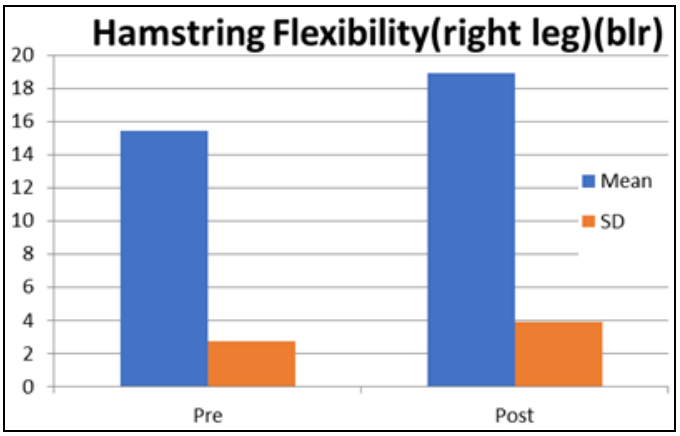

Fig 1

Table 1

	PRE	POST
MEAN	15.41666667	18.90333
SD	2.762692756	3.909536

The p value is <0.0001 considered extremely significant.
t= 10.039 with 29 degrees of freedom

For left leg

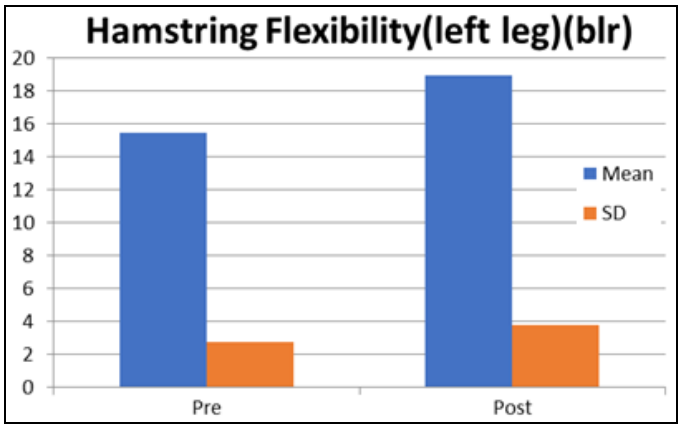

Fig 2

Table 2

	PRE	POST
MEAN	15.44667	18.93333
SD	2.738327	3.787851

The p value is <0.0001 considered extremely significant.
t=12.142 with 29 degrees of freedom

- **Back saver sit and reach score post traction-slr**

For right leg

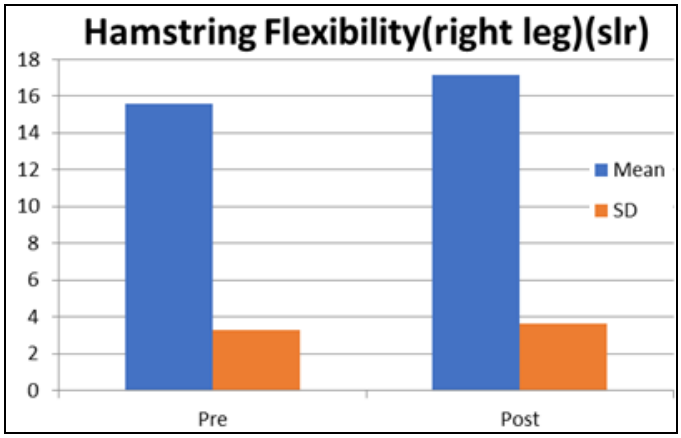

Fig 3

Table 3

	PRE	POST
MEAN	15.58333	17.14
SD	3.283195	3.631529

The p value is <0.0001 considered extremely significant.
t=9.425 with 29 degrees of freedom

For left leg

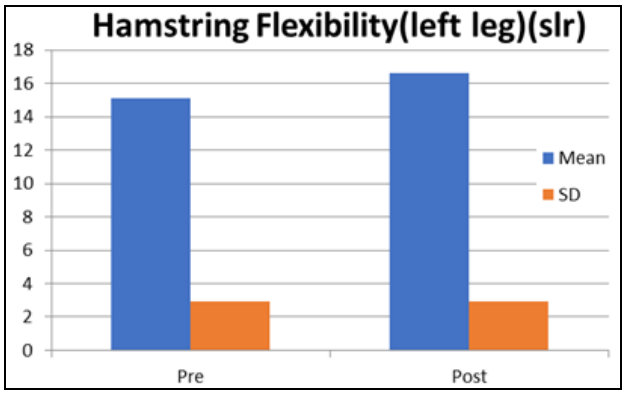

Fig 4

Table 4

	PRE	POST
MEAN	15.11667	16.63333
SD	2.918914	2.898434

The p value is <0.0001 considered extremely significant.
t=17.571 with 29 degrees of freedom

For right side

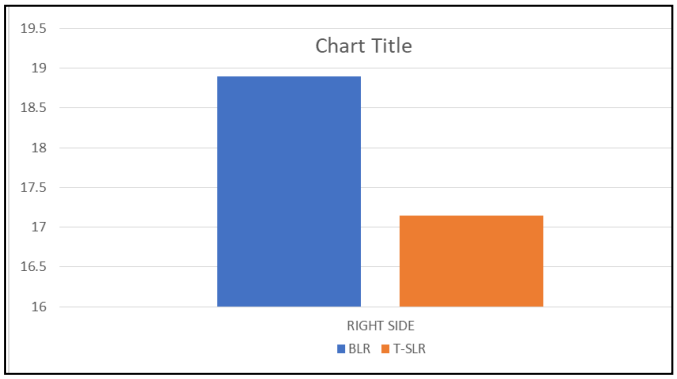

Fig 5: Comparison of BSSR score post BLR and post T-SLR for Right side

Table 5

	POST BLR	POST T-SLR
Mean	18.903	17.140
Standard Deviation	3.910	3.632
p value	0.0755	
t test value	1.810	

Inter-group comparisons: (Comparing post values)

For left side

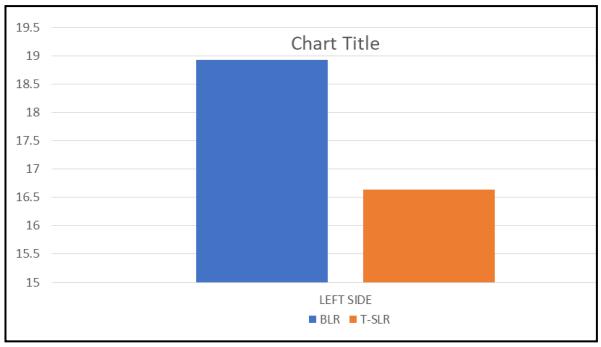

Fig 6: Comparison of BSSR score post BLR and post T-SLR for Left side

Table 6

	Post BLR	Post t-SLR
Mean	18.933	16.633
Standard Deviation	3.788	2.898
p value	0.0106	
t test value	2.641	

Result

Post data analysis showed that GROUP A (Mulligan Bent leg raise) has shown significant improvement in flexibility on the Back saver sit and reach test score as compared with GROUP B (Traction straight leg raise).

Discussion

The primary purpose of this study was to compare the effect of Mulligan's Bent leg raise and Traction straight leg raise on hamstring flexibility in young adult population.

60 subjects were taken amongst which 38were females and 22were males based on inclusion criteria which was age between18 to 25, both male and female gender, subjects having bilateral hamstring tightness with BSSR score below 8. Subjects with any history of musculoskeletal injury to lower extremity in the past 3 months and active with gymnasium activities were excluded Measurements using Back saver sit and reach test was taken before and after treatment session. The result of the present study demonstrated that Mulligan Bent Leg Raise and Traction straight leg raise increases immediate post-intervention hamstring flexibility. Both the groups showed improvement in Back saver's sit and reach flexibility measurements. Golgi tendon organs are activated during large amplitude stretching movements such as SLR. This processing of information in the nervous system may inhibit the activity of the muscles being lengthened during SLR by dampening the afferent activity of type II muscle

spindles or by decreasing motor neuron excitability via 1-b fibres. Hence, the improvement in range of SLR may be directly related to inhibition of the hamstring muscles rather than changes due to stretch tolerance [14].

Various research over Mulligan's BLR method suggest it as contract relax method where contract relax cycles applied to hamstrings provide peripheral somatic input to the contracting muscle [15]. According to Lewit and Simons the post-isometric relaxation achieved during the technique is effective in reducing Trigger point sensitivity and pain intensity. The technique involved stretching the muscle containing the Trigger point, followed by an isometric contraction against minimal resistance. After the contraction, the muscle was first allowed to relax, and then it was stretched Post-isometric relaxation is claimed to be an effective method for acute tension in soft tissue problems, reduces muscle spasm, reduces pain and lengthen the tightened muscles.

In the current study the post-BLR intervention mean readings were 3.48(difference of pre-post) while post-TSLR is 1.54 with p-value <0.001 considered extremely significant. After statistical analysis inter-group comparisons showed that Bent leg raise was more effective.

Conclusion

Mulligan's bent leg raise technique appeared to be more effective than Traction Straight leg raise to increase hamstring flexibility.

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