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COMPARISON OF BENT LEG RAISE TECHNIQUE WITH HOLD RELAX IN IMPROVING HAMSTRING FLEXIBILITY IN YOUNG ADULTS

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Abstract

Aim. Aim of the study is to compare the Bent Leg Raise technique with hold relax in improving hamstring muscle flexibility in young adults.

Design. A comparative study was done.

Background. The hamstring muscles are important contributors to the biomechanical alterations in lower limbs and back. There is a lot of literature present which shows the effect of Bent Leg Raise Technique, Proprioceptive Neuromuscular Facilitation (PNF) on hamstring tightness but there is no research present till now which shows the comparison between both the techniques. Therefore the present study is designed to investigate that out of both the techniques which serve better results in the management of hamstring tightness.

Methods. A sample of 50 subjects were taken and divided into two groups on the basis of clinical assessment and after fulfilling inclusion and exclusion criteria. Hamstring tightness was measured by the test performed by the subjects and then 50 subjects were divided into two groups namely Group A Bent Leg Raise Technique and Group B Hold and Relax Technique .

Results. Mean was taken for the BMI of Group A was 23.16 + 11.138 and for group 2 the mean was 21.72 + 3.64. The pre mean for the hamstring muscle tightness of group A was 59.96 +0.188 degree and post mean for the hamstring muscle tightness of group A was 90 +0.402 degree. The percentage improvement in this group was found to be 50.1%.

The pre mean for the hamstring muscle tightness of Group B was 63.48 + 0.39 degree and post mean for the hamstring muscle tightness of group 2 was 84.16 +0.36 degree. The percentage improvement in this group was found to be 83.16%.

Conclusion. It is inconclusive that between Bent Leg Raise and Hold Relax which one is more effective in hamstring tightness. Based on the investigation of the study it was found that there is significant difference within both the techniques. Hence alternate hypothesis is accepted.

Keywords- Bent leg raise, hamstring tightness, hold relax.

1.Introduction

Physical activity comprises all modes of movement caused by muscle activity resulting in increased energy expenditure. Physical fitness consists of the three components muscle strength, endurance and motor ability. Flexibility is an important physiological component of physical fitness, it is important to allow an adequate range of motion, to avoid sport injuries. Flexibility of muscle is "the ability of a muscle to lengthen, allowing one joint to move through a range of motion" leading to more efficiency and effectiveness in movement which assist in preventing or minimizing injuries, & muscle soreness. Flexibility is the property of individual muscles and joint. Many factors influence an individual's flexibility including age, race, gender, tissue temperature, circadian rhythms, strength training, stiffness and warm-up. Maintaining normal muscle length requires regular stretching to prevent muscle stiffness and benefit from the decreased risk of musculoskeletal injuries (Scott D et al, 2005). The Hamstring muscles are important contributors to the control of movement and are involved in wide range of activities from running and jumping to forward bending during sitting or standing and a rage of postural control actions (Stephens et al, 2006).Good muscle flexibility will allow muscle tissue to accommodate to imposed stress easily and allow effective and efficient movement.The ability of an individual to move smoothly depends on his flexibility, an attribute that enhances both safety and optimal physical activity. Muscle tightness is caused by a decrease in the ability of the muscle to deform, resulting in a decrease in the range of motion at the joint on which it acts (Akinpelu AO et al, 2005).Adequate flexibility may help to prevent muscle strain and such orthopaedic problems such as backache. Active and passive stretching expands the range of motion by working in muscle tendons, capsules and ligaments. Stretching of muscle before the performance is very important. Loss of flexibility is defined as a decrease in the ability of a muscle to deform. Some of the proposed benefits of enhanced flexibility are reduced risk of injury, pain relief and improved athletic performance (Hartig DE et al, 1999).Decreased flexibility of hamstring leads to hamstring injury. Several factors have been hypothesized to be a risk for hamstring injury. This includes hamstring muscle strength, balance, warm-up, fatigue, flexibility, body mechanics and sports specific activities, psychosocial factors and running techniques.Stretching is an important therapeutic and exercise training modality for increasing joint range of motion. When a muscle or muscle group is passively stretched using static, dynamic or proprioceptive neuromuscular facilitation (PNF) stretching there may be short term changes in the muscle. Muscle tightness is caused by a decrease in the ability of the muscle to deform, resulting in a decrease in the range of motion at the joint on which it acts. Tightness in hamstring muscles leads to hamstring injuries and hamstring injuries.Stretching is important for reducing injury and improving performance in sports and for overall physical fitness. Athletes are often given stretching protocol to improve their flexibility. Hamstring tightness is defined as the inability to extend the knee to less than 20 degrees of knee flexion with the femur held at 90 degree of hip flexion while the person was positioned in supine (J Brent Feland, 2001). Hamstring stretches are routinely used as a part of pre-exercise routine, usually

after an aerobic warm up (Kieran O'Sullivan, 2009). A lack of pelvic mobility, due to tightness in the hamstring muscles and impaired core muscle strength, could limit pelvic mobility. Hamstring is an example of those muscle groups that have a tendency to get shorten. Hamstring muscle has a tendency to undergo shortening by the age of 5-6 years, as child start to do any activity or sedentary lifestyle. Many people suffer with tight hamstring. This will limit the sporting activity and responsible for postural problems and other back problems as they tend to pull the pelvis posteriorly.There are various methods to increase ROM are: static, ballistic and dynamic stretching as well as proprioceptive neuromuscular facilitation. Among stretching methods, static stretching is most commonly utilized; however, as a part of a warm-up, it has been shown to decrease power and performance.Adequate range of movement may be more important for long term injury prevention. Flexibility is a key component for injury prevention and rehabilitation. Stretching is important for injury prevention and improving performance for physical fitness.Hamstring tightness is defined as the inability to extend the knee to less than 20-30 degrees of knee flexion with femur held at 90 degree of hip flexion when the person is positioned in supine (Feland et al., 2001).

Maintaining normal muscle length requires regular stretching to prevent muscle stiffness, decrease risk of musculoskeletal injuries and enhance physical performance. Maintaining the flexibility of hamstring muscle is important for the general and athletic population and of utmost importance for health care professionals, to achieve this goal one needs to know the most effective and efficient technique to gain flexibility of hamstring muscle (NagarwalA.K. et al., 2010).When a muscle or muscle group is stretched passively using techniques like in static, dynamic, proprioceptive neuromuscular facilitation (PNF) stretching there may be some short term changes in the muscle (Knudson et al., 2000). A proper stretching program is key to improving flexibility. Some research suggests that stretches be held for 30 seconds, with at least 3–4 sets (Malliaropoulos et al., 2004).Proprioceptive Neuromuscular Facilitation (PNF) is a stretching technique utilized to improve muscle elasticity and has been shown to have a positive effect on active and passive range of motions (Funk et al., 2003). Proprioceptive Neuromuscular Facilitation (PNF) is a more advanced form of flexibility training that involves both the stretching and contraction of the muscle group being targeted. PNF stretching was originally developed as a form of rehabilitation. While there are several variations of PNF stretching, they all have one thing in common; they facilitate muscular inhibition. PNF is a stretching technique utilized to increase range of motion and flexibility. PNF increases ROM by increasing the length of the muscle and increasing neuromuscular efficiency. Stretching enhances the performance and decreases the risk of injury during exercise, as well as to improve Range of Motion (McCarthy et al., 1997). Bent Leg Raise (BLR) is a painless technique and can be applied on any patient who has limited or painful straight leg raise. It can be tried with patients who have a gross bilateral limitation of straight leg raise. Bent leg has been proved separately to be effective in improving hamstring flexibility in previous studies.Inability to achieve greater than 160° of knee extension with hip at 90° of flexion is considered as hamstring tightness (Waseem M et al., 2009). Physiotherapy approach in the treatment of hamstring tightness with two different techniques- Bent Leg Raise Technique and Isometric Contraction during Hold and Relax.Studies are available for the use of stretching techniques for hamstring flexibility.Considering above this research will provide insight about which of the two techniques i.e.; BLR technique and Isometric Contraction during Hold and Relax, used in this study are more effective in producing less fatigue and hence improvement of performance of an individual.

2.Methods

Males and females of age 18-25 years of age and subjects with positive test toe touch, active knee extension test and sit and reach test were included in the present study. Individuals with any neurological abnormalities, any recent joint pathology or recent surgery and trauma and any biomechanical abnormalities of lower extremity were excluded.

Measurement Apparatus

- Universal goniometer
- Cross Bar: To maintain position of hip at 90-degree thigh during Active Knee Extension Test.
- A treatment couch.
- Measuring tape
- Wooden box
- Marker
- Weighing machine
- Stadiometer

2 Procedure

Subjects were explained about the procedure individually and consent form was signed by them and height and weight were taken. Two tests were performed by the subjects to check the tightness of hamstring muscle.

1. Sit and Reach test:

A reach box was placed on the floor, by placing tape at a right angle to the 30cm mark. The participant sat on the floor with shoes off and fully extended the legs so that the sole of the feet was flat against the end of the box.
Student then place extended arms forward, placed one hand on top of the other. With palms down, she/he reached forward sling hands along the measuring scale as far as possible without bending the knee of the extended leg. Three trials were performed and the average of the three trials was used for subsequent analyses.

2. Active Knee Extension Test:

The AKE test subjects were in supine lying with hip and knee flexed at 90-degree cross bar were used to maintain the proper placement of the hip and thigh during active knee extension. The distal part of the anterior surface of thigh was placed in contact with cross bar line of a specially constructed wooden frame; the subject was instructed to actively extend the knee to the point where they started feeling a stretch. Popliteal angle was measured by goniometer. The 20 degree or more than 20-degree extension was considered as hamstring tightness (Maggieet al, 2004).

After the selection of the subjects through inclusion and exclusion criteria, weight and height of the subjects were taken and then pre-test readings were recorded for sit and reach test and active knee extension test. Note the pre reading for straight leg raise (hip flexion with knee extension) and subjects were divided into two groups.
The study was conducted in the campus of Manav Rachna International University. On the basis of inclusion and exclusion criteria 50 subjects were taken in two groups.

Group 1: BLR technique
25 subjects were taken in this group. Subject was in supine position. Therapist was standing by the side of the patient. Subject's flexed knee was placed over the therapist's shoulder and hip traction was given. Asks the subject to push the therapist's shoulder down with his leg. At the same time therapist was pushing the subject's knee up as far as possible in the direction of the therapist shoulder on the same side. Use this technique again and measure the post test reading for straight leg raise (hip flexion with knee extension) with the help of goniometer.

Group 2: Hold relax
25 subjects were taken in this group. Subject was in supine position. Therapist was standing by the side of the subject. Therapist kept the subject's leg on his shoulder and as the patient to push the therapist's shoulder down and hold that position for 7 seconds and then ask the patient to relax for 5 seconds. The therapist passively stretched the muscle until a mild stretch sensation was reported. This was repeated for 5 times. At the end of the procedure post- test reading for straight leg raise (hip flexion with knee extension) was measured by the help of goniometer.

3 Results

Mean was taken for the BMI of Group A was 23.16 + 11.138 and for group 2 the mean was 21.72 + 3.64. The pre mean for the hamstring muscle tightness of group A was 59.96 +0.188 degree and post mean for the hamstring muscle tightness of group A was 90 +0.402 degree. The percentage improvement in this group was found to be 50.1%.

The pre mean for the hamstring muscle tightness of Group B was 63.48 + 0.39 degree and post mean for the hamstring muscle tightness of group 2 was 84.16 +0.36 degree. The percentage improvement in this group was found to be 83.16%.

	GROUP 1	GROUP 2
BMI	23.16 + 11.138	21.72 + 3.64

Table 3.1: Representing the BMI between both the groups

	group 1(BLR)	group 2(HOLD RELAX)
PRE SLR LEFT (in degrees)	59.72±7.789	63.24±8.22
PRE SLR RIGHT	60.2±7.413	63.73±7.44
POST SLR LEFT	90.08±6.553	83.36±7.67
POST SLR RIGHT	89.92±7.358	84.94± 6.95

Table 3.2: Representing pre and post mean between both the groups

4.Discussion

The present study was done on the subjects with Hamstring flexibility measured by sit and reach test and by active knee extension test. 50 subjects were taken on the basis of inclusion and exclusion criteria. Subjects were divided into two groups i.e. group 1 and group 2. BLR technique was given to group 1 and Hold and Relax technique was given to group 2.

The percentage improvement in group 1 (BLR) was found to be 50.1% and the percentage improvement in group 2 (Hold and Relax) was found to be 83.16%. The improvement was seen because stretching of hamstring muscle passively increases the extensibility of the muscles.

Toby Hall et al, (2005) concluded that after a single intervention of BLR technique, immediate improvement was not observed but the technique was effective in improving the range of straight leg raise (SLR) after 24 hours.

Stretching enhances the performance and decreases the risk of injury during exercise, as well as to improve Range of Motion (McCarthy et al., 1997). Active and passive stretching expands the range of motion by working in muscle tendons, capsules and ligaments. Hamstring stretches are routinely used as a part of pre-exercise routine, usually after an aerobic warm up (Kieran O'Sullivan, 2009). A lack of pelvic mobility, due to tightness in the hamstring muscles and impaired core muscle strength, could limit pelvic mobility. When a muscle or muscle group is stretched passively using techniques like in static, dynamic, proprioceptive neuromuscular facilitation (PNF) stretching there may be some short-term changes in the muscle (Knudson et al., 2000).

Proprioceptive Neuromuscular Facilitation (PNF) is a more advanced form of flexibility training that involves both the stretching and contraction of the muscle group being targeted (Funk et al., 2003). PNF increases ROM by increasing the length of the muscle and increasing neuromuscular efficiency. According to Oves Patni et al, BLR was one such technique which was widely used in the practice but had been least studied on its effectiveness to reduce tightness of hamstring muscles.

A lengthened muscle could have a less than optimal crossbridge overlap, according to length-tension relationship, could diminish muscle force output. Elongation of tendinous tissues can have an effect on force output through a reduction in either the passive or active stiffness of the musculoskeletal unit (Sullivan et al, 2013)

Limitations of the study

- Small sample size was there
- There was no homogeneity in the distribution
- Readings were not taken after 24 hours to check the effectiveness.

Future scope of the study

- Can be performed in other age group also
- Readings can be taken after 24 hours to check the effect of the technique
- Equal number of population can be taken
- More variables can be added

5.Conclusion

It is inconclusive that between Bent Leg Raise and Hold Relax which one is more effective in hamstring tightness. Based on the investigation of the study it was found that there is significant difference within both the techniques. Hence alternate hypothesis is accepted.

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