

A Study to Compare the Effectiveness of Static Stretching and Hold Relax Technique Over Hamstring Flexibility for Collegiate Athletes

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Abstract: *The aim of the study is to compare the effectiveness of static stretching and hold relax techniques over hamstring flexibility for collegiate athletes. To evaluate the baseline levels of the hamstring flexibility in collegiate athletes through standardized testing procedures. To implement a structured static stretching program, consisting of a series of static stretches targeting the hamstrings, for a designated group of participants. To administer a hold-relax techniques program, which involves a combination of passive stretching and isometric muscle contractions for another group of participants. **Objective:** The objective of the study is to compare the effectiveness of static stretching and hold relax techniques over hamstring flexibility for collegiate athletes. **Background of the Study:** Flexibility is defined as the ability of the muscles to lengthen allowing one joint or more than one joint in a series to move through a range of motion. Flexibility allows tissue to accommodate more easily to stress thus minimizing or preventing muscle injury. But this study sought to identify the study to compare the effectiveness of static stretching and hold relax technique over hamstring flexibility for collegiate athlete. **Materials and Methodology:** An experimental study was done to compare the effectiveness of static stretching and hold relax technique over hamstring flexibility for collegiate athletes. The inclusion criteria were age group of 18-25, athletes with hamstring tightness and the exclusion criteria were anyone having neurological problem in lumbar region, lower limb fracture etc. **Procedure:** Group A consists of 15 subjects who were trained with static stretching. Group B consists of 15 subjects who were trained with hold relax technique. Outcome measure sit and reach test and active knee extension test to measure the hamstring length. **Result:** On comparing pretest and posttest value within group A and group B and posttest value between the groups on sit and reach test and active knee extension test shows highly significant difference in mean values at $p \leq 0.001$. **Conclusion:** From the results obtained it is concluded that there is very highly significant enhancement in hamstring flexibility following both static stretch and hold relax technique in hamstring muscle. Further comparison the post treatment effect of both static stretch and hold relax concludes that hold relax is better.*

Keywords: Hamstring, flexibility, sit and reach test, hold relax and static stretching

1. Introduction

Flexibility is characterized by the ability of a muscle to relax and yield to a stretch force Basmajian & Wolf 1990 also by range of motion available in a joint or group of joint. It is also defined as the ability to move a single joint or series of joint smoothly & easily through an unrestricted pain free ROM. Flexibility refers to the range of motion that you can achieve at any joint through any particular movement. Flexibility is a fundamental component of athletic performance, and it plays crucial role in preventing injuries, enhancing range of motion, and optimizing overall athletic abilities. Hamstring flexibility, in particular, is of paramount importance for athletes, especially collegiate athletes who engage in various sports requiring dynamic movements and agility. To improve hamstring flexibility, athletes often utilize different stretching techniques, including static stretching and proprioceptive neuromuscular facilitation (PNF) methods such as the hold-relax technique.

The importance of hamstring flexibility for athletes cannot be overstated. Tight hamstrings are a common issue in athletes, and they can lead to increased risk of injuries, including muscle strains, ligament tears, and joint-related problems. Inadequate flexibility can also hinder an athlete's performance by limiting the range of motion in joints, reducing power output, and impeding the execution of certain movements critical in their respective sports. Hamstring tightness leads to high risk of recurrent injury, decreases the performance in athletes, lead to post-exercise soreness and decreases coordination among athlete. There is higher percentage of prevalence of hamstring tightness in

right lower extremities. The hamstring muscles are commonly linked with movement dysfunction at the lumbar spine, pelvis and lower limbs, and have been coupled with low back pain and gait abnormality. Limited flexibility causes neuro - musculoskeletal symptoms. These musculoskeletal symptoms will lead to decrease in strength, stability, endurance and much more. All these things will lead to recurrent injury and might affect psychosocial aspect of the athlete.

Objectives of the Study

To evaluate the effectiveness of static stretching in patients with hamstring tightness. To evaluate the effectiveness of hold relax technique in patients with hamstring tightness. To compare the effectiveness of static stretching and hold relax technique over hamstring flexibility for collegiate athletes.

Outcome Measures

In this study we are using the two outcome measures to find the hamstring flexibility and range of motion.

- Sit and reach test
- Active knee extension test

Sit and Reach Test

The Sit and reach test is one of the linear flexibility tests which helps to measure the extensibility of the hamstrings and lower back. It was initially described by Wells and Dillon in 1952 and is probably the most used flexibility test. It has a simple procedure, is easy to administer, requires minimal skills training for its application, and the equipment necessary to perform the test is affordable.

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Active Knee Extension Test: The opposite limb is elevated so that the hip is in 90 degrees of flexion and the knees are extended to reach a position perpendicular to the ground. A lag of 20 degrees is considered normal from full extension, anything less than 20 degrees is considered as hamstring tightness. This range needs to be measured using a goniometer placed at the knee with the fulcrum at the lateral epicondyle, the stationary arm parallel to the thigh pointing to the greater trochanter and the moveable arm parallel to the leg pointing to the lateral malleoli.

2. Procedure

Static stretching (SS) is a slow-paced controlled physical activity which involves putting the body part in a comfortable position that elongates the muscle without causing pain with low force for a prolonged duration of time (usually 30 seconds).

There are two types of static stretching:

- Active-static stretching involves performing static stretches without assistance.
- Passive-static stretching involves performing the stretches passively with assistance from an external force which can be a partner, an accessory or the force of gravity.

Effects of static stretching:

Improves range of motion in the joint
Reduces stiffness and pain in muscles
Reduces the risk of muscle strains and other injuries
Improves postural awareness and body posture

Increases circulation which in return decreases recovery period after exercise

Hold-relax it is a method rooted in the proprioceptive neuromuscular facilitation (PNF) approach, have been applied with the intention of stimulating sensory receptors that provide information about body position and movement to facilitate a desired motion.

The 30 subjects are those who come under selection criteria, they are divided into two groups, group A and group B. All the subjects had attended the trail session two days before the actual test.

Both the groups (Group - A & Group - B) undergone pretest with the help of sit and reach test and active knee extension test is to find hamstring flexibility before training and recorded as pre test score. The determination of sit and reach test, where a yard stick is placed on top of a box and box is approximately 12 inches tall. The measurement point of the scale was placed at tibial tuberosity and it was common for both the groups.

The determination of active knee extension test, where the subject is positioned on the examination table in supine, the lower limb that is not examined is positioned in stabilized on the support surface. The opposite limb is elevated so that the hip is in 90 degrees of flexion and the knees are extended to reach a position perpendicular to the ground. A lag of 20 degrees is considered normal from full extension, anything

less than 20 degrees is considered as hamstring tightness and it was common both the groups.

Group A: Static Stretching Over Hamstring Flexibility

No. of patients: 15

Study duration: 3 Weeks

Treatment duration: 4 days\weeks (2 sessions per day totally 24 sessions)

Position the patient on a treatment table or mat, lying on their back with both legs extended.

Identify leg to be stretched (usually one at a time) and gently lift it off the table. Keep the knee extended.

The opposite leg should remain on the table with the knee extended to provide support and stability.

Gently grasp the patient's ankle or calf of the raised leg. Ensure a secure but gentle grip.

While holding the patient's leg, slowly and gently bring it up towards their chest, keeping the knee extended. This will stretch the hamstring muscle.

Maintain the stretched position for 15-30 seconds, allowing the patient to breathe deeply and relax into the stretch. Ensure that the stretch is within the patient's comfort range and does not cause pain.

Depending on a patient's needs and initial flexibility, you may choose to repeat this process 2-4 times for the same leg.

The group A had been trained with static stretch (passive stretch), duration of the stretch was 30 sec, and 10 sec rest, for 4 sessions in a day and 5 days in a week and it was continued for 3 weeks.

Group B: Hold Relax Techniques Over Hamstring Flexibility

No. of patient: 15

Study duration: 3 Weeks

Treatment sessions: 4 days \ week (2 sessions per day totally 24 sessions)

Position the athlete on a treatment table or mat, lying on their back with both the legs extended.

Instruct the athlete to push their raised leg gently against your resistance, creating an isometric contraction in the hamstring muscles. Hold this contraction for about 5-10 seconds.

After isometric contraction, instruct the athlete to completely relax the hamstring muscle. Encourage them to take a deep breath and exhale slowly to aid relaxation.

While the hamstring is relaxed, gently and passively stretch the leg gently and passively stretch the leg further into the desired range of motion

Hold the stretched position for 15-30 seconds, allowing the athlete to breathe deeply and relax into the stretch. Depending on the athletes needs and initial flexibility, you may choose to repeat this process 2-4 times for the same leg.

3. Data Analysis

The data was analyzed by paired 't' test and unpaired 't' test. The collected data tabulated and analyzed by using descriptive and inferential statistics. The statistical

package for calculated and analyze the above mentioned descriptive and inferential statistics.

Data was entered and analyzed using SPSS ver. 20 software. The prevalence and demographic distribution of hamstring flexibility were expressed as percentages. Chi square test was to use compare the demographic data with hamstring flexibility incidence. A p value (<0.05) was considered statistically significant.

Group	Test	Mean	Median	SD	t Value	P Value
Group A	Post Test	24.07	24	2.24	2.5722	0.0232
Group B	Post Test	27.06	28	3.305		

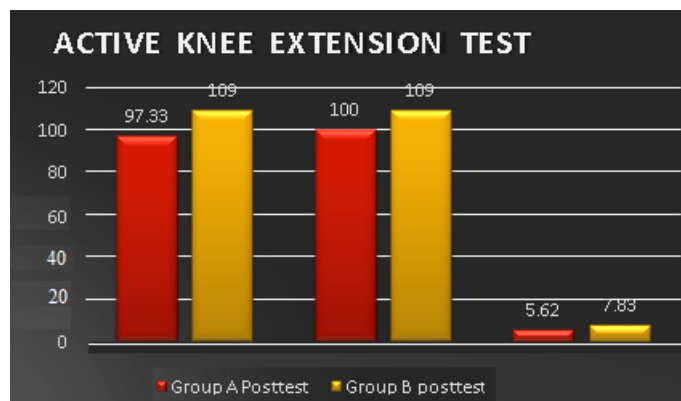
Comparison between group- A and group- B post test values of sit and reach test



Comparison between group- A and group- B post test values of sit and reach test

Group	Test	Mean	Median	SD	t Value	P Value
Group A	Post Test	97.33	100	5.62	5.1469	0.0002
Group B	Post Test	109	110	7.83		

Comparison between group a and group b post test values of active knee extension test



Comparison between group a and group b post test values of active knee extension test

4. Results

A total of 30 subjects were taken in this study. Group - A 15 subjects trained with static stretch and Group - B 15 subjects trained withhold relax techniques for hamstring flexibility.

According to the table, it was observed that there is a significant difference between the pretest and post test value of sit and reach test with 't' value of 17.48 using paired 't' test. It was also observed that there is a significant difference

between the pretest and posttest value of active knee extension test with 't' value of 3.97 group A (static stretch).

In group B, it was observed that there is significant difference between the pretest and posttest value of sit and reach test with 't' value of 2.93 using paired 't' test. It was also observed that there is a significant difference between the pretest and posttest value of active knee extension test with 't' value of 7.61 (hold relax).

Further comparison of the post test values of the group A (static stretch) and group B (hold relax) shows a significant difference between the outcome measures of sit and reach test 't' value is 2.5722 and the active knee extension test 't' value is 5.14 (unpaired 't' test).

5. Discussion

This study was designed to compare the effects of static stretching and hold relax techniques over hamstring flexibility for collegiate athletes. Group A 15 subjects had static stretching and group B 15 subjects had hold relax techniques for 3 weeks.

Static stretching involves holding a muscle in a lengthened position for an extended period, typically around 15-30 seconds. This technique is widely practiced due to its simplicity and accessibility. Collegiate athletes often incorporate static stretching into their warm-up and cool-down routines to enhance flexibility. Static stretching has shown to be effective in gradually improving hamstring flexibility. When performed consistently over time, it can lead to increased muscle length, reducing the risk of muscle strains and promoting better overall mobility. For collegiate athletes improved hamstring flexibility can be particularly beneficial in various sports that require explosive movements or changes in direction.

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