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## ORIGINAL ARTICLE

**TO COMPARE THE EFFECTIVENESS OF PASSIVE STRETCHING  
VERSUS PNF HOLD RELAX TECHNIQUE ON HAMSTRING  
TIGHTNESS IN YOUNG INDIVIDUALS**

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### ABSTRACT

**Background of The Study:** Hamstring is one of the commonest muscles often get tight as the biomechanics of hamstrings are complex because they pull over hip and knee joints. Stretching methods often define the development and improves body's range of motion. Goal of all stretching relaxation is to provide joint mobility while maintaining joint stability. Hold relax is a technique of facilitating normal muscle sensation and muscle awareness. It is a relaxation technique to obtain lengthening reaction of muscle whose action is antagonist to movement limited in range. It is effective, simple and pain-free. PNF is used to supplement daily stretching and employed to quick gain in ROM, decreases in fatigue, prevent overuse injuries. The main objective of this study is to compare the effectiveness of passive stretching over PNF hold relax technique on hamstring tightness in young individuals. **Materials And Methods:** 100 normal male and female subjects were recruited for the study with age group of 18-25 yrs and divided into two groups. Group A (n=50) treated with passive stretching Group B (n=50) treated with hold relax PNF technique. Outcome measures of the study were Finger Tip to Floor test, Back Saver Sit and Reach test. **Result:** The study shows there is statistical significant difference with  $P \leq 0.001$  between Group A and B. When compare the two groups, Group B with PNF Hold relax gives more effective than the Group A with Passive stretching with Back Saver Sit and Reach test. **Conclusion:** The study concluded that PNF Hold Relax technique showed greater improvement than Passive Stretching on hamstring flexibility.

**Key words:** Hamstring flexibility, Passive stretching, PNF hold relax, Finger Tip to Floor test, Back Saver Sit and Reach test.

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## INTRODUCTION

Hamstring tightness is common in normal individual because of immobilization in a shortened position results in adaptive shortening. Tightness could make the musculo-tendinous unit more susceptible to injury, increases resistance to anatomical structures, which may leads to overuse syndrome. Muscle tightness affects the normal length tension relationship. Muscle tightness also cause reciprocal inhibition<sup>1</sup>.

The hamstring flexibility is defined as the ability to move a joint or series of joints through full, unrestricted, pain-free range of motion. Flexibility is a key component for Prevention of injury and rehabilitation, stretching decreases injury and improves performance in sports for overall fitness. Increased flexibility: While stretching your hamstring can increase flexibility and improve your range of motion in your joints. Improved hamstring flexibility which will be able to perform everyday activity like climbing stairs, lifting or bending over with greater ease. Reduced hamstring muscle flexibility has been implicated in lumbar spine dysfunction, with number of studies showing positive correlation between decreased hamstrings, flexibility and low back pain<sup>2,3</sup>.

The hamstring muscle refers to those muscles that lie on the back of upper leg and thighs. They are strong muscles that can stretch up to 1.5 times their size, with regular stretching exercises. These muscles are used in almost all physical activity and keeping them stretched and goes a long way in improving overall flexibility and strength. Hamstring stretch are popular stretch used by gymnast, runners and sprinter to improve the flexibility of their muscles and to get ready with a warm up stretches with just the wall or a study chair for

support loosen up tight muscles and improves blood flow to the lower limbs. Hamstring muscles make more flexible, preventing injury and tearing of the muscles<sup>4</sup>.

**Passive stretching:** Passive stretching is also referred to as relaxed stretching. A passive stretch is a stretch where an individual will assume a position and hold it with the help of therapist/partner. The specificity of movement that a person performs in regular physical activity and stretching method often define the development and improve body's range of motion. Goal of passive stretching programme is to provide joint mobility while maintaining joint stability.

**PNF Technique:** PNF is defined as exercises that enhance a neuro muscular response through the proprioceptors. Proprioceptive neuro-muscular facilitation is used as inhibition technique to assist with muscle elongation. PNF is used to supplement daily stretching when employed to quick gain in range of motion; it decreases fatigue and prevents overuse injuries. Hold relax technique involves lengthening a tightened muscle and asks the patient to isometrically contract the muscle for several seconds. As the patient relaxes, after the contraction, the therapist lengthen the involved muscle further and holds the stretch at the end range of motion. Hold relax is a technique of facilitating normal muscle sensation and muscle awareness, used in treating hyper tonicity or motor dysfunction. It is often applied when there is muscle tightness in one side of joint and when immobility is the result of pain. PNF stretching was found to decrease muscle force in the hamstring muscles in response to the application of sudden stretch as might occur during functional activity.

**Need of the study:** Hamstring is one of the commonest muscles often get tight. The biomechanics of hamstrings is complex because they are two joints (hip & knee). Goal of passive stretching relaxation should be provided for joint mobility and maintaining joint stability. PNF Hold relax is a technique for facilitating normal muscle sensation, muscle awareness and decreases fatigue to prevent overuse injuries. The main aim of this study is to compare the effectiveness of passive stretching and PNF hold relax technique on hamstring tightness in young individuals.

## METHODOLOGY

This is an experimental study with Pre and Post Comparative test. The study was conducted at Physiotherapy department, ACS Medical college and Hospital campus, Chennai. 100 normal subjects with age group of 18-25 yrs were recruited for the study and divided into two groups. Random sampling method used to allocate the samples in each group. Group A (n=50) treated with passive stretching Group B (n=50) treated with hold relax PNF technique. The study conducted for a duration of 2 months. Subjects with Recent fractures, Spinal deformity, TB spine, Psychological disorders were excluded from this study. Outcome measures of the study were Finger tip to floor test, Back saver sit and reach test. Materials used for this study were informed consent, Inch tape, Scale, Couch Mark sheet.

## Intervention

**Finger -Tip- To Floor Test:** The patient stands comfortably with the feet facing forward and is asked to bend forward. The instruction is to bend forward without bending their knees, attempt to touch the floor with your fingertips, go only as far as you can".

Distance between the patient long finger and the floor is measured in inches. The process is performed once, the best effort is measured.

**Back saver sit and reach test:** The variations of the traditional sit and reach test is to measure the flexibility of the left and right legs separately. This is the procedure used for the Fitness Gram Program. This test measures the flexibility of the lower limb and hamstring muscles. Back Saver Sit And Reach Test is extremely high<sup>5,6</sup>.



**Fig. 1** Finger tip to floor test.

## Group A: passive stretching.

**Procedure:** The patient in supine position. The therapist should kneel down on the mat and place the patients heel against own shoulder and placed both hands along the anterior aspect of distant thigh to keep knee extended, opposite extremity is stabilized in extension position and therapist knee place by with in 0 degree extension, hip in neutral position and then investigator flexes the hip as far as possible. The stretching duration for 30 seconds.

**Group B: PNF hold relax technique.**

**Procedure:** The patient in supine lying position. For each stretching, therapist give passive stretching until the patient reports mild stretching sensation and hold that position for 30 seconds by asking his / her leg to push back towards against resistance of therapist shoulder, after contraction and relaxation for 30 seconds, measurement should be taken.



**Fig .2** Passive Stretching.



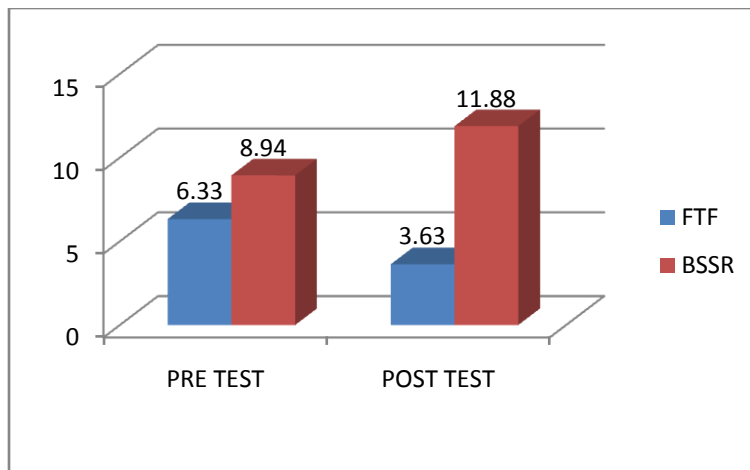
**Fig.3** PNF Hold Relax technique

**RESULT**

In Table 1 with group a, ftf and bssr have significant difference between the pre test & post test ( $p \leq 0.001$ ).

GROUP A	PRE TEST		POST TEST		't' test	'P' value
	MEAN	SD	MEAN	SD		
FTF	6.33	2.50	3.63	2.17	5.759	.000
BSSR	8.94	1.23	11.88	1.44	10.951	.000

**Table 1** Comparison of FTF and BSSR in group a between pre and post test.

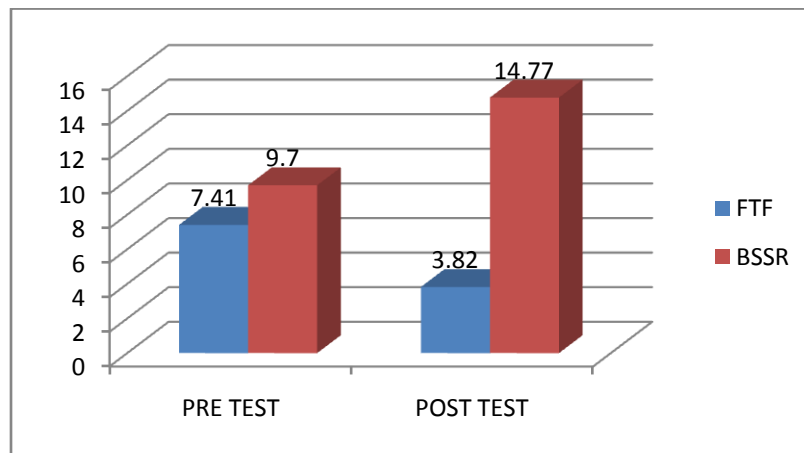


**Graph 1.** Comparison of FTF and BSSR in Group A between Pre and Post test.

GROUP B	PRE TEST		POST TEST		't' test	'p' value
	MEAN	SD	MEAN	SD		
FTF	7.41	2.30	3.82	2.19	7.993	.000
BSSR	9.70	1.63	14.77	1.80	14.289	.000

**Table 2** Comparison of FTF and BSSR in Group B between Pre And Post Test.

In table 2 with Group B, FTF and BSSR have significant difference between the pre & post test value ( $P \leq 0.001$ ).

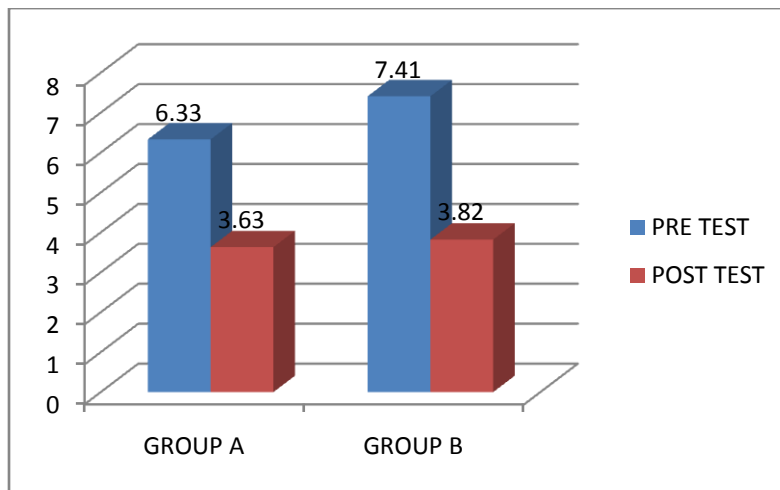


**Graph 2.** Comparison of FTF and BSSR in Group B between Pre and Post test.

FINGER TIP TO FLOOR	GROUP A		GROUP B		't' test	'p' value
	MEAN	SD	MEAN	SD		
PRE TEST	6.33	2.50	7.41	2.30	2.247	.027
POST TEST	3.63	2.17	3.82	2.19	.435	.664

**Table 3.** Comparison of FTF between Group A And B in Pre And Post Test.

This table shows that there is no significant difference in the pre test value between Group A and Group B ( $P \geq 0.05$ ). This table shows that there is no significant difference in the post test value between Group A and Group B ( $P \geq 0.05$ ).

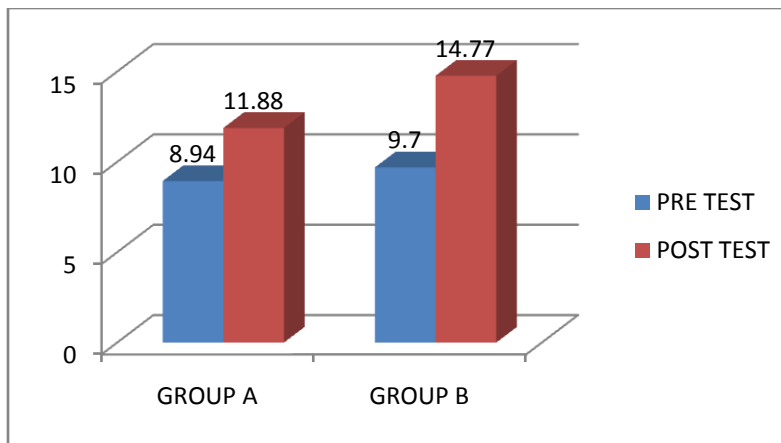


**Graph 3.** Comparison of FTF between Group A and B In Pre and Post test.

BSSR	GROUP A		GROUP B		't' test	'p' value
	MEAN	SD	MEAN	SD		
PRE TEST	8.94	1.23	9.70	1.58	2.675	.09
POST TEST	11.88	1.44	14.77	1.80	8.839	.000

**Table 4** Comparison of bssr between group a and b in pre and post test.

This table shows that there is no significant difference in the pre test values in the score between Group A and B. This table shows statistically significant difference in post test values in BSSR score between Group A & Group B ( $p \leq 0.001$ ).



**Graph 4.** Comparison of bssr between group a and b in pre and post test.

## DISCUSSION

The present study compared the effectiveness of passive stretching and PNF Hold Relax technique on hamstring tightness in young individuals. In this study suggested that Group B [PNF Hold Relax technique] showed greater improvement than Group A .

There is another study which shows there is no significant difference in ROM in standing & supine hamstring stretching as they are equally effective conducted by “Decoster LC (2004)<sup>7,8</sup>.

In Table 1, it shows significant increase in post test mean value of Group A [passive stretching] which has more effective mean value than pre test. In table-1 shows statistically highly significant difference in BSSR & FTF between pre test and post test ( $p \leq 0.001$ ).

In Table 2 shows significant increase in post test value of BSSR compare to FTF in Group B [PNF Hold Relax technique]. The pre test reduces compared to post test in BSSR of Group B shows significant between pre and post test ( $p \leq 0.001$ ).

In Table 3 shows effective increases in Group B compared to Group A, but it shows a negative pattern between pre and post test. Sharman Malanie who found that proprioceptive neuromuscular facilitation produces superior ROM<sup>9,10,11</sup>.

In Table 4 shows significant increases in Group B compared to Group A ( $P \leq 0.005$ ). Therefore the use of PNF hold relax technique in Group B ( $p \leq 0.001$ ) shows greater effective than Group A which will reduce the hamstring tightness.

A number of studies have demonstrated that stretching muscle tissue can increase joint range of motion<sup>12,13,14</sup>.

**Ethical Clearance:** Ethical clearance has obtained from Faculty of Physiotherapy, DR.MGR Educational and Research Institute, Chennai to conduct this study with reference number: 025/ PHSIO/ IRB/2016 dated 06/02/2016.

**Conflict of interest:** There was no conflict of interest to conduct this study.

**Fund for the study:** It was a self financed study.

## CONCLUSION

The result suggested that PNF Hold Relax technique showed greater improvement than Passive Stretching. This study reveals that there is a significant difference between passive stretching and PNF Hold Relax technique. In the end of this study, PNF Hold Relax Technique is found to be more effective and reduces the tightness of hamstring muscles compared to passive stretching groups.

**Limitation of the Study:** The sample size of this study was small.

**Recommendation of the Study:** This study can conduct with different age groups. The sample size can be increased in upcoming studies. Different outcome measures recommended.

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