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## EFFECTIVENESS OF PASSIVE STRETCHING VERSUS HOLD RELAX TECHNIQUES IN FLEXIBILITY OF HAMSTRING MUSCLE

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### ABSTRACT

**Aim:** To compare the effectiveness of passive stretching and hold relax techniques in the flexibility of hamstring muscle.

**Methods:** A total of 80 normal healthy female subjects between age group 20-30 years referred to the department of physiotherapy, Sumandeep Vidyapeeth University, sampling method being convenient sampling. The subjects were randomly divided in two groups i.e. passive stretching group (n=40) and Proprioceptive Neuromuscular Facilitation (PNF) group (n=40) and given passive stretching and proprioceptive neuromuscular facilitation technique respectively. Active knee extension range was measured before and after the intervention by goniometer.

**Results:** The t test showed a highly significant ( $p=0.000$ ) increase in range of motion in Proprioceptive Neuromuscular Facilitation (PNF) group.

**Conclusion:** Proprioceptive neuromuscular facilitation (PNF) technique is more effective in increasing hamstring flexibility than the passive stretching.

**Key Words:** Stretching, Flexibility, PNF, Hold-relax, Hamstring.

### INTRODUCTION

Flexibility is a key component for prevention of injury and rehabilitation, stretching decreases injury and improves performance in sports for overall fitness.<sup>1</sup>

Stretching is a therapeutic manoeuvre designed to increase mobility of soft tissue and subsequently improves range

of motion by elongating structures that have adaptively shortened and have become hypomobile over time.<sup>2</sup>

Proprioceptive neuromuscular facilitation (PNF) is used as inhibition technique to assist with muscle elongation.<sup>3</sup> Passive stretching and isometric contraction encourage flexibility or coordinate throughout limbs range of motion. Proprioceptive neuromuscular facilitation is used to supplement daily stretching when employed to quick gain in range of

motion it decreases fatigue and prevents overuse injuries.<sup>4</sup>

A 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.<sup>5</sup> It is a relaxation technique to obtain a lengthening reaction of muscle whose action is antagonistic to movement limited in range, it means increasing range of movement in joints, it is effective, simple and pain free.<sup>3</sup>

Stretching recommendations are clouded by many misconceptions and conflicts. Research reports despite being limited has been promoted for years as an integral part of fitness programme to decrease risk of injury and relieve pain associated with sports.<sup>6</sup> 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 all stretching programme is to provide joint mobility while maintaining joint stability.<sup>7</sup>

Muscle tightness is a limiting factor for optimal physical performance and an important intrinsic factor for sports injury.<sup>8</sup>

Hamstring as one of the commonest muscles often gets tight as the biomechanics of hamstrings are complex because they pull over two joints - hip and knee. Therefore, their efficacy in producing force at knee is dictated by the angle of hip joint. Greater hamstring force is produced

with hip in flexion when hamstring is lengthened over joint, regardless of knee position.<sup>1</sup> Tight hamstrings can have profound effect on seated postural alignment. Posterior pelvic tilt is a primary effect, with resultant kyphotic thoracic spine and stress on cervical spine either hyper extended or flexed. If hamstrings are unequally tight, the pelvis will rotate away from tighter hamstrings. For example; if right hamstrings are tighter, the pelvis will rotate towards left.<sup>9</sup> 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>10</sup>

## METHODOLOGY

A total of 80 asymptomatic subjects among student community of Sumandeep Vidyapeeth University, Baroda, within 20-30 years of age group were included in this study who met the inclusion and exclusion criteria.

### **Inclusion criteria:**

- Age- 20 to 30 years
- Sex – Females

### **Exclusion criteria:**

- Orthopedic problems
- Neurological conditions
- Psychological disorders

### **Instrumentation:**

- Double arm goniometer
- Stop watch
- Pen
- Pencil and paper

## PROCEDURE

In this study, 80 subjects were included within age group 20-30 years who fulfilled inclusion criteria. Before starting intervention, active knee extension range in high sitting position with hip in 90 degree flexion was measured through goniometer. After completion of study, active knee extension range was measured again in the same way. Subjects were equally divided in two groups as follows.

### **Group 1: Passive Stretching Group which was given passive stretching**

Procedure: Investigator knelt down on the mat and placed patient's heel or distal tibia against own shoulder and placed both of hands along the anterior aspect of distant thigh to keep knee extended, opposite extremity is stabilized in extension by belt and held in place by therapist's knee with in 0 degree extension, hip in neutral rotation and then investigator flexes the hip as far as possible.

### **Group 2: PNF Group which was given Hold Relax technique**

Procedure: Subjects were randomly assigned and modified hold relax stretch performed with hip in neutral position. For each stretching, investigator gave passive stretching until the subject reported mild stretching sensation and held that position for 7 seconds, next, sub maximal isometric contraction of hamstring muscle for 7 seconds by asking the subject to push her leg back towards the table against the resistance of investigator after contraction

relaxation for 5 seconds. Investigator then passively stretched the muscle until the mild stretch sensation was reported the stretch was held for 7 seconds. This sequence was repeated 5 times on each subject.

## RESULT ANALYSIS

In intergroup comparison there is increase in range of motion ( $73.65^{\circ}$ ) after passive stretching in Group 1 and range of motion (ROM) increased after hold relax ( $79.32^{\circ}$ ) than before hold relax ( $73.05^{\circ}$ ) in Group 2.

## DISCUSSION

The current study is a comparative study done with an attempt on increasing the hamstring length by using 2 different techniques, i.e. passive stretching and hold relax.

In this study, 80 normal female subjects have been taken and randomly divided into 2 groups. Active knee extension is measured using goniometer before any physical intervention and at the end of intervention it is measured again.

The study shows highly significant increase in ROM in both groups but this finding cannot be generalised or converted to clinically significant data since sample of male population in current study is not included, while comparing both groups, hold relax is found more effective than passive stretching (t-value -4.763).

Hold relax has been found to be more effective because the isometric muscle action completed immediately before the passive stretching which helps to achieve autogenic inhibition - a reflex

relaxation that occurs in muscle where the golgi tendon organ is stimulated.

The present finding is in accordance with “Scott Spernoga et al, who found that sequence of 5 modified hold relax stretching produced significant increase in hamstring flexibility.<sup>11</sup> On the basis of this study, modified hold relax protocol has been used and the present study shows that hold relax increases more range of motion<sup>11</sup>, this is consistent with “Sharman Malanie” who found that proprioceptive neuromuscular facilitation produces superior ROM<sup>12</sup>.

Our current study is not in accordance with “Worrell TW et al. (1994), who found that 60 seconds stretching had no improvement in ROM as for ROM to be maintained, stretching must be continued<sup>13</sup> and “Sullivan Mk, et al. (1992) who concluded that there is no significant increase in hamstring flexibility with either of stretching technique.<sup>14</sup>

There is another study which shows that there is no significant difference in ROM in standing and supine hamstring stretching as they are equally effectively conducted by “Decoster LC (2004).<sup>15</sup>

Certain variables are uncontrolled in the study and their influence on the results is assumed to be null, the result affected by assumption which is different level of physical activity of subjects. The difference in the force applied for stretching to the subjects may be confounding factor in result obtained.

## CONCLUSION

It is conclude that hold relax a technique of proprioceptive neuromuscular facilitation is more effective in increasing hamstring flexibility than passive stretching.

## SUGGESTIONS

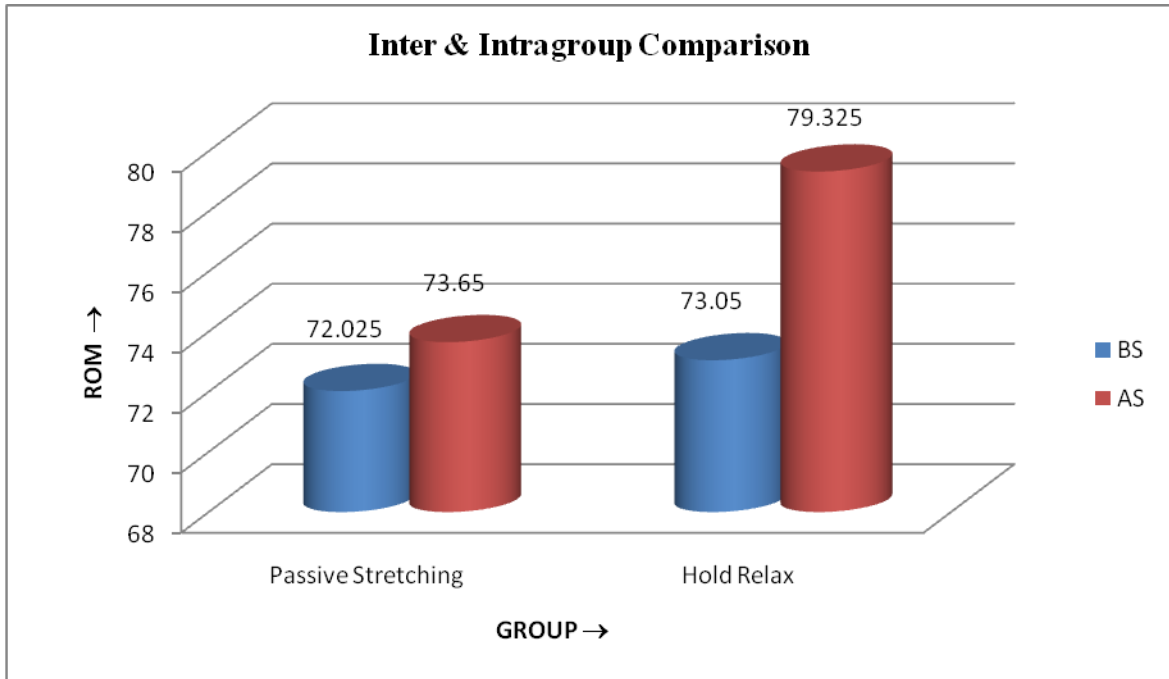
The limitations of the current study were the sample size and female population. Though the result obtained was very highly significant to generalize the findings into a clinically useful data the study has to be replicated in a bigger sample size.

If the uncontrolled variables of the current study could be controlled, the sensitivity and specificity of the findings can be increased. Further studies should also aim at studying both the genders separately to obtain a more accurate and generalized results

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*Figure1. Shows Comparison of Range of Motion (ROM) between Passive Stretching & Hold Relax Group.*

Note: BS → Before Stretching & AS → After Stretching

This figure shows intragroup comparison between Group 1 (i.e. Passive Stretching) & Group 2 (i.e. Hold Relax) which clearly depicts increase in Range of Motion (ROM) in Group 2.