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EFFECTIVENESS OF ACTIVE STRETCHING VERSUS PASSIVE STRETCHING OF HAMSTRINGS MUSCLES IN NORMAL INDIVIDUALS."

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Abstract:

Background & Objective: Active stretching is purported to stretch the shortened muscle and simultaneously strengthen the antagonist muscle. The purpose of this study was to determine whether active and passive stretching results in a difference between groups improving hip flexion and knee extension ROM subjects with hamstring tightness.

Subjects and methods: Thirty subjects who showed decreased ROM, presumably due to hamstring muscle tightness. The subjects, who had age of 18 to 30 years, were assigned to either an active stretching group or passive stretching group. Before the procedure, ROM of hip flexion with knee extension forward reach test and muscle length test was measured before and after 3 weeks of the start of the study.

Results: Results from this study found that Flexibility of hamstring muscle & ROM of hip flexion with knee extension is increased in group with Passive Stretching than the group with Active Stretching.

Conclusion: Passive Stretching of hamstring muscle in normal individuals is more effective than Active Stretching.

***Key words*:** Active stretching, Passive stretching, Forward reach test, Muscle length test

I. INTRODUCTION

The hamstring muscle consists of three muscles: the biceps femoris muscle, semitendinosus muscle, and semimembranosus muscle. These muscle combined are primarily responsible for flexion of knee joint (bending of the knee) as well as assisting the extension of thigh (moving the upper leg backwards). In addition to these functions, the hamstring muscle work in tendon to rotate the knee, assist in maintaining a standing position with slightly bent as well as limiting how far we can bend forward as we try to touch our toes without bending our knees. The hamstring muscle also plays a role in our posture by assisting to straighten out the lower curvature of the spine which curves the pelvis forward when sitting.

The origin attachment point of biceps femoris muscle arise as two-heads from the ischial tuberosity region of the pelvis as a tendon which is shared with the semitendinosus muscle. Another short-head arise from outside-edged of the Linea Aspera. The fibers of the short head merge into those of the long head, which then have an insertion attachment point on the head of fibula.

The semitendinosus muscle has an origin attachment point from the ischial tuberosity region of the pelvis as tendon shared with the biceps femoris, and has an insertion attachment point on the upper shaft of tibia.

The semimembranosus muscle has an origin attachment point from just in front of semitendinosus muscle on the ischial tuberosity region and has five insertion attachment points: The main one on the posterior portion of the medial condyle of the tibia. A second insertion point is the fascia which covers the popliteus muscle and the remainder insert joining the tibial collateral ligament of the joint and the fascia of the leg.

The tightness of hamstring muscles is one of the main factors hindering performance8 in daily and sporting activities. Reduction in the flexibility of the hamstrings has been reported to be associated with the occurrence of back pain in adolescents and adults in cross-sectional studies. Furthermore, reduction in the flexibility of the hamstrings has been reported to increase the risk of damage to the musculoskeletal system. Thus, flexibility of the hamstrings is important for general health and physical fitness. Several studies have indicated that flexibility of the hamstrings is improved by stretching. Indeed, many stretching techniques are used in clinical practice, including ballistic stretching, static stretching, and proprioceptive neuromuscular facilitation techniques. Among the stretching methods, passive and active stretching techniques are easy to implement and are useful as home exercises. Active stretching increases the flexibility of tight muscles.

While concomitantly improving the function of antagonistic muscles. In contrast, passive stretching is characterized by the addition of stretch stimulation on muscle contraction independent of the subject. This method is as an alternative to static stretching. During DROM, a contraction by the antagonist muscle causes the joint crossed by the agonist muscle to move through the full ROM at a controlled, slow tempo. DROM is a technique that takes advantage of reciprocal innervation. However, Bandy et al. reported that

passive stretching is more effective than DROM, but their study had different stretching conditions, such as different stretch elongation times, and was not an accurate comparison of the stretching techniques. To our knowledge, no studies have compared active and passive stretching techniques using the same method for the hamstring muscles. Thus, the purpose of this study was to compare the effect of passive and active stretching techniques using the same method on the flexibility of the hamstring muscles.

Methodology

Sample size: The study was carried on 30 subjects.

Source of data: Subjects were recruited from Anand and protocol was executed in Shree B.G Patel College Of physiotherapy Anand.

Sampling method: Convenience sampling method

Study duration: 3 weeks

Inclusion criteria:
1. Age group of 18 to 30 years.
2. Both Gender: male and female
3. Individuals with no history of knee and hip pain.
4. Individuals with hamstring tightness.
5. Individuals without history of neurological impairment and condition affecting hamstring flexibility
6. Cooperative subjects.

Exclusion criteria:
1. Individuals with history of hip & knee injury.
2. Individuals with history of neurological complication.
3. Individuals with any systemic diseases.
4. Individuals who are not fit into the inclusion criteria.

Data and Procedure:
This study was consisted of 30 subjects of both sexes aging between 18-30 years. Subjects were explained about the procedure of measuring hip and knee range of motion by goniometer; hamstring flexibility and informed consent were be obtained from each participant. Then the patients were be screened based on inclusion and exclusion criteria and randomly divided in to 2 groups i.e. group A and group B, having 15 subjects in each group.

Group A: Group of passive stretching -Subject in passive stretching group were positioned supine with their hip and knee flexed at 90º, their lumbar lordosis was supported with lumbar roll, and Their knee extended by one examiner while lying supine with 90° of hip flexion (Degrees from full extension). Stretches were performed times in 3 sets of the assigned stretch. Each stretch was held for 10 seconds at the point where tightness in the hamstring muscles was felt, and then the leg was slowly lowered (over 10 seconds). Stretches at maximum knee extension elicited a “strong but tolerable feeling of muscular tightness” in the back of subject leg.

Group B: group of active stretching - Subject in passive stretching group were positioned supine with their hip and knee flexed at 90º, their lumbar lordosis was supported with lumbar roll. Subject extended their own knee. Stretches were performed times in 3 sets of the assigned stretch. Each stretch was held for 10 seconds at the point where tightness in hamstring muscle was felt, and then the leg was slowly lowered. (Over 10 second).

Outcome:

MLT: (90-90 knee extension test)

The subject lies supine, head back and arms across the chest. The hip is passively flexed until the thigh is vertical. Maintain this thigh position throughout the test, with the opposite leg in a fully extended position. The foot of the leg being tested is kept relaxed, while the leg is actively straightened until the point when the thigh begins to move from the vertical position. The thigh angle at this point is recorded. Measure the minimum angle of knee flexion with the thigh in the vertical position. The measurement unit is degrees. If the leg is able to be fully straightened, the angle would be recorded as 0. Any degree of flexion will be recorded as a positive number, e.g. 10, 20 degrees etc. In cases where the full knee extension is achieved without thigh movement, the knee is flexed and the thigh is moved to 30 degrees past the vertical position, and the knee again straightened. The angle of knee flexion at which the thigh begins to move is again recorded.

FRT: (sit and reach test)

This test involves sitting on the floor with legs stretched out straight ahead. Shoes should be removed. The soles of the feet are placed flat against the box. Both knees should be locked and pressed flat to the floor - the tester may assist by holding them down. With the palms facing downwards, and the hands on top of each other or side by side, the subject reaches forward along the measuring line as far as possible. Ensure that the hands remain at the same level, not one reaching further forward than the other. After some practice reaches, the subject reaches out and holds that position for at least one-two seconds while the distance is recorded. Make sure there are no jerky movements.The score is recorded to the nearest centimeter or half inch as the distance

reached by the hand. Some test versions use the level of the feet as the zero mark, while others have the zero mark 9 inches before the feet.

Statistical analysis:

Statistical analysis was performed by using SPSS software for window (version16) and p value was set as 0.10(two tailed hypothesis).

Descriptive statistics and Chi square test was used to analyze baseline data for demographic representation.

Unpaired t test and Wilcoxon signed ranked test was used to find the significance of parameters pre to post test.

Result:

The analysis of outcome measurement B/W group A & Group B has been presented in tables and graphs. Group A was Passive Stretching and Group B was Active Stretching.

Table: 1 comparison between group A & B - ROM of right side.

Hip flexion with knee extension				
Group	**Mean**	**Mean Difference**	**t Value**	**p Value**
GROUP A	64.07	19.06	5.466	<0.0001
GROUP B	83.13			

Comparison of mean difference between two groups. In this when the mean value of group A (64.07) compared with mean value of group B (83.13), the mean difference is 19.06, the 't' value is 5.466, and 'p' value is 0.0001 which is highly significant.

Table:2 Comparison between group A & B - ROM of left side.

Hip flexion with knee extension				
Group	**Mean**	**Mean Difference**	**t Value**	**p Value**
GROUP A	73.67	9.46	3.351	0.0048
GROUP B	83.13			

Comparison of mean difference between two groups. In this when the mean value of group A (73.67) compared with mean value of group B (83.13), the mean difference is 9.46, the 't' value is 3.351, and 'p' value is 0.0048 which is highly significant.

Table: Comparison between group A & B - MLT of right side.3

Muscle length test				
Group	**Mean**	**Mean Difference**	**t Value**	**p Value**
GROUP A	41.8	11.87	4.06	0.0012
GROUP B	29.93			

Comparison of mean difference between two groups. In this when the mean value of group A (41.8) compared with mean value of group B (29.93), the mean difference is 11.87, the 't' value is 4.06, and 'p' value is 0.0012 which is highly significant.

Table:4 Comparison between group A & B - MLT of left side.

Muscle length test				
Group	**Mean**	**Mean Difference**	**t Value**	**p Value**
GROUP A	34.73	9	3.397	0.0043
GROUP B	25.73			

Comparison of mean difference between two groups. In this when the mean value of group A (34.73) compared with mean value of group B (25.73), the mean difference is 9, the 't' value is 3.397, and 'p' value is 0.0043 which is highly significant.

Table:5 Comparison between group A & B – FRT

Forward reach test				
Group	**Mean**	**Mean Difference**	**t Value**	**p Value**
GROUP A	8.567	1.967	1.351	0.1982
GROUP B	6.6			

Comparison of mean difference between two groups. In this when the mean value of group A (8.567) compared with mean value of group B (6.6), the mean difference is 1.967, the 't' value is 1.351, and 'p' value is 0.1982 which is highly significant.

Table:6 Demographic details M/F

Gender	Group: A	Group: B	Total
Male	1	5	6
Female	14	10	24
Total	15	15	30

Discussion:

According to the results obtained from the study titled "**EFFECTIVENESS OFACTIVE STRETCHING VERSUS PASSIVE STRETCHING OF HAMSTRING MUSCLE IN NORMAL INDIVIDUALS."**

When the mean value of comparison of mean difference between two groups for ROM of right side. In this when the mean value of group A (64.07) compared with mean value of group B (83.13), the mean difference is 19.06, the't' value is 5.466, and 'p' value is <0.0001 which is highly significant.
This shows that there was a significant difference in the Group A.

Comparison of mean difference between two group for ROM of left side. In this when the mean value of group A (73.67) compared with mean value of group B (83.13), the mean difference is 9.46, the 't' value is 3.351, and 'p' value is 0.0048 which is highly significant.
That shows that group A has better intervention than the group B.

Comparison of mean difference between two groups for MLT of right side. In this when the mean value of group A (41.8) compared with mean value of group B (29.93), the mean difference is 31.87, the 't' value is 4.06, and 'p' value is 0.0012 which is highly significant
That shows that group A has better intervention than the group B

Comparison of mean difference between two groups for MLT of left side. In this when the mean value of group A (34.73) compared with mean value of group B (25.73), the mean difference is 9, the 't' value is 3.397, and 'p' value is 0.0043 which is highly significant. That shows that group A has better intervention than the group B

Comparison of mean difference between two groups for FRT. In this when the mean value of group A (8.567) compared with mean value of group B (6.6), the mean difference is 1.967, the 't' value is 1.351, and 'p' value is 0.1982 which is not significant, That shows that group A has better intervention than the group B.

As the result has shown above the interventions of the group A is better than the group B. Flexibility is increased in group A than group B and the range of motion is better improved in group A.

Conclusion

There were less effects of active stretching on hamstring muscle of normal individuals than passive stretching.
As results show that active stretching on hamstring muscle of normal individuals was not that much effective. Passive stretching increases ROM as well as increases the flexibility. As we had result that passive stretching was quite more effective than active stretching.

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