THE EFFECT OF STATIC STRETCHING AND PNF HOLD – RELAX STRETCHING ON INCREASING FLEXIBILITY OF SHORTENED HAMSTRING MUSCLE AMONG SEDENTARY LIVING FEMALE STUDENTS"-A COMPARATIVE STUDY

Dr. Bharath.M., MPT [1], M.Dhivya[2], Dr.Lokesh.R., MPT.,(Ph.D)[3]

[1]Associate professor, Department of Orthopedic physiotherapy, Adhiparasakthi college of physiotherapy, Melmaruvathur, Tamilnadu. Gmail: marybharath2008@gmail.com

[2]BPT Intern, Department of physiotherapy, Adhiparasakthi College of Physiotherapy, Melmaruvathur, Tamilnadu. Gmail: dhivya18703@gmail.com

[3]Associate Professor, Research & Development Coordinator, Department Of Cardio Respiratory Physiotherapy, Adhiparasakthi College Of Physiotherapy, Melmaruvathur, Tamilnadu.

Email: drlokeshpt@gmail.com

ABSTRACT

BACKGROUND :

Hamstring muscle plays an important role in functional activities and relaxation. Shortened muscle may hampers the functional activities and goes for muscle tightness and have limited flexibility that leads to reduce in range of motion at joint. The most widely used method for increasing muscle flexibility is stretching.

AIM OF THE STUDY :

The aim of the study is to determine and compare the effect of Static Stretching and PNF Hold-Relax stretching technique on improving hamstring muscle flexibility on sedentary living female population aged between 18-25 years.

MATERIALS AND METHODS :

A total of 50 female students were selected with the age group of 18-25 years living sedentary lifestyle with tightened hamstring muscles with knee extension range >20 degree. The students were randomly divided into two groups namely GROUP A Static Stretching (n=25) and GROUP B PNF Hold – Relax stretching (n=25), based on inclusion and exclusion criteria. Active Knee Extension Test (AKE) and Straight Leg Raise Test (SLR) were used as outcome measures.

RESULT :

The mean value of PNF Hold- Relax stretching technique at the post test was found to be higher than the mean value of Static Stretching technique.

CONCLUSION :

Based on the statistical analysis this study concluded that PNF Hold -Relax stretching technique is more effective than Static Stretching technique on improving flexibility of shortened hamstring muscle among sedentary living female students.

KEYWORDS :

Static Stretching, Hold-Relax, hamstring muscle tightness, Active Knee Extension Test, Straight Leg Raise Test, knee extension range

INTRODUCTION:

Reduction in hamstring muscle flexibility is a very common clinical finding in young adults, or it considered as an extremely common Musculo-skeletal complaint or disorder which is a root cause of functional disorders. Hamstring tightness can result from either increase in tension from active or passive mechanism. Actively, muscle can become shortened due to spasm and passively, muscle become shortened through postural adaptation.[2]

However, hamstring muscle is the most common muscle that goes into shortening or gets tighten either an individual is living sedentary lifestyle or active lifestyle[1]. Hamstring tightness occurs in early age and tends to increase with age. Sheetal mahadik conducted a study on prevalence of hamstring tightness in youngsters aged 18-25 years in which she conducted 82% of youngsters facing issues of hamstring tightness assessed by active knee extension test.[2]

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It is stated that most widely used method for increasing muscle flexibility is stretching.It has found to be effective in many conditions for instance, increasing the length of shortened muscle, strengthening the weak muscle and increasing range of motion of restricted joints.[6]

Two methods of stretching programme i.e, PNF-Hold relax and Static Stretching increasing Flexibility of hamstring muscle.[2] The static stretch takes advantage of inverse myotatic reflex, which promotes muscle relaxation and further increase range of motion.[11]

Proprioceptive Neuromuscular Facilitation is a most used and effective form of stretching technique that include both stretching and contraction of the muscle group this PNF Hold -Relax stretching technique utilize to increase ROM and Flexibility.[8]

OBJECTIVE OF THE STUDY:

To evaluate the effectiveness of Static Stretching on increasing flexibility of shortened hamstring muscle among sedentary living female students.

To determine the effectiveness of PNF hold-relax stretching on increasing flexibility of shortened hamstring muscle among sedentary living female students.

To compare the effectiveness of Static Stretching and PNF Hold-Relax stretching on increasing flexibility of shortened hamstring muscle among sedentary living female students.

REVIEW OF LITERATURE :

1. DEBASIS BEHERA et al, (2024): This study showed tightness of hamstring muscle among college going students.it has been concluded that an increase in hours of prolonged sitting may cause hamstring tightness.
2. BHAGYASHREE K.KOLI et al, (2018):This study shows that the prevalence of hamstring tightness is very high in college going students of age group 18-25.hence awareness of hamstring stretching is important to prevent musculoskeletal problem of lower quadrant
3. AMIT KUMAR SINGH et al, (2017): This study concluded that PNF (HOLD RELAX) Stretching technique is more effective than neurodynamic sliding technique for improving hamstring flexibility.
4. SRINIVAS MONDAM et al, (2017): This study shows that static stretching exercise is more effective in increasing the hamstring flexibility

STUDY DESIGN:

This study was designed as an cross-sectional study conducted in the Physiotherapy Outpatient Department of Adhiparasakthi College of Physiotherapy located in Melmaruvathur. A convenient sampling method was employed to select participants. The data collection was carried out over a period of four weeks with sessions three days per week.

INCLUSION CRITERIA:

Healthy sedentary living female individual having hamstring tightness with Knee Extension angle more than 20 degree, During Straight Leg Raise, if the leg cannot be raised beyond 80 degrees then hamstrings are considered tight, Age between 18-25 years , Gender

(females) , Without any previous hamstring injury since past 1 year, Willingness of subjects to participate.

EXCLUSION CRITERIA:

Any surgical history on spine or lower limb from a year, Those who do regular stretching or exercise, History of low back pain , Subject not willing to participate, Athletes.

Before initiating physiotherapy interventions, it is crucial to screen for serious underlying conditions that may contraindicate or modify treatment approaches. Red flag conditions such as cervical radiculopathies, malignancy, recent or past trauma, and active infections must be carefully considered. Additionally, systemic issues such as vertigo, myocardial infarction, or chronic heart diseases may present with overlapping symptoms and should be thoroughly evaluated to ensure patient safety and appropriate referral when needed.

METHODOLOGY:

A total of 50 female students were selected from APCOPT with the age group of 18-25 years living sedentary lifestyle with tightened hamstring muscles with knee extension range >20 degree. The students were randomly divided into two groups namely GROUP A Static Stretching (n=25) and GROUP B PNF Hold – Relax stretching (n=25), based on inclusion and exclusion criteria. Active Knee Extension Test (AKE) and Straight Leg Raise Test (SLR) were used as outcome measures.

TREATMENT TECHNIQUE:

1. Static stretching
2. PNF Hold –Relax stretching

1. STATIC STRETCHING:

The subject is asked to be comfortable in Supine position and concentrate on relaxing the muscles of lower extremity as much as possible.The therapist then starts the stretching protocol with passively raising (Hip flexion) the leg to the point of muscular restriction and holds that position for 20 seconds with resting period of 5 seconds.While the contralateral leg is placed in complete extended position which is stabilized by strap to prevent movement throughout the intervention. The stretching intervention of passive Static stretch was repeated 10 times in a set, a day. This Stretching protocol is performed 3 days in a week, for consecutive 4 weeks.[6]

2. PNF HOLD RELAX STRETCHING:

The subjects were in supine position and both the leg extended in relaxed position. For the aim of every stretch, the therapist stretched the hamstring muscle by passively flexing the hip with knee in complete extended position and allows no rotation at hip.The lower leg was rested on the therapist shoulder.The hamstring muscle was stretched until the subject first reported a mild stretch sensation; this position was held for 15 sec. Then, the subject was asked to isometrically contract the hamstring muscle for 5 seconds by pushing her leg down towards the bed against the resistance given by the therapist.Followed by this, the subject was asked to relax the leg for 5 seconds. Again, the therapist passively stretched the muscle until a mild stretch sensation reported. This stretch was held for 10 sec. This sequence is performed 5 times in every repetition. The stretching was administered with 5 repetitions, a set for consecutive 3 days per week for period of 4 weeks.[6]

OUTCOME MEASURE:

ACTIVE KNEE EXTENSION TEST

Active knee extension test was measured with goniometer while the patient in supine lying with hip and knee at 90 degree flexion. The stable arm of goniometer was placed along the shaft of femur pointing the greater trochanter and the moveable arm along tibial shaft pointing the lateral malleolus with lateral knee joint line as a fulcrum. The patient were asked to extend the testing knee actively as much as possible.T he knee active extension is measured by goniometer. When the knee extension angle is more than 20 degree it is considered as tight hamstrings.[7]

STRAIGHT LEG RAISE TEST

The subject was placed in supine position and advised to relax during the entire assessment. The therapist flexed the tested limb, with the knee completely extended and the foot in a relaxed position. The contralateral limb will be stabilized. When the participant feels a strong resistance, the movement will be stopped. The goniometer was placed over the greater trochanter, with one arm parallel to the table and other arm aligned with the lateral femoral condyle. Measurement was taken in the final position of the leg. If the Patient leg can't be raised more than 80 degrees, their Hamstrings are considered tight.[7]

RESULT:

Data analysis was performed using statistical software SPSS v26.0 applying paired sample t-tests to compare pre- and post-intervention outcomes within both groups. In Group A (Static stretching), Active Knee Extension Test (AKET) showed a improvement in hamstring flexibility, with a pre-test mean of 47.8400 increasing to 54.0000 post-test (t =21.47, p=.000), indicating a statistically improvement. Similarly, Straight Leg Raise Test (SLR) improved markedly from a mean of 60.5600 pre-test to 67.7600 posttest (t =14.49, p = .000), showing a improvement in hamstring flexibility. In Group B (PNF Hold Relax Stretching), AKET also demonstrated statistically significant improvement from 48.5200 to 58.8000 (t =24.11, p = .000), while SLR test from 62.4000 to 74.2000 (t =14.56, p = .000). Although both interventions produced statistically improvement in hamstring flexibility. Group B exhibited significant improvement in post-test values in both AKET and SLR, suggesting that PNF Hold Relax Stretching is more effective than Static Stretching for patients with Hamstring Tightness.

DISCUSSION:

Reduction in hamstring muscle flexibility is a very common clinical finding in young adults, or it considered as an extremely common Musculo-skeletal complaint or disorder which is a root cause of functional disorders. Hamstring tightness can result from either increase in tension from active or passive mechanism. Actively, muscle can become shortened due to spasm and passively, muscle become shortened through postural adaptation The static stretch takes advantage of inverse myotatic reflex, which promotes muscle relaxation and further increase range of motion.

Fiza raza Rizvi, Nilofar Rasheed (2020) Their study stated that the effect of static stretching and PNF hold relax stretching on increasing flexibility of shortened hamstring muscle among sedentary living female students.With the support of recent past evidence, the present study also proves that using of PNF Hold Relax stretching is more significant in increasing the flexibility of shortened hamstring muscle than the static stretching.

CONCLUSION:

From the study it concluded that the PNF Hold-Relax stretching (GROUP B) significantly effective in improving hamstring flexibility Compared to Static Stretching (GROUP A).

LIMITATIONS AND SUGGESTIONS:

LIMITATIONS:

Study was restricted to female subjects only, Duration of study is less, The study was conducted only with particular age group.

SUGGESTIONS:

Further study can be done with using different outcome measures, The study can be done for different age group with different duration, Comparing the stretching method among both male and female.

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