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ORIGINAL ARTICLE

Comparison of the effectiveness of static stretching and hold relax technique on hamstring flexibility; A Randomized Control trial

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ABSTRACT

Aim: In order to manage discomfort and increase range of motion, this study compared the effectiveness of static stretching versus the hold-relax approach on hamstring flexibility.
Study design: The study design was Randomized Controlled Trial (RCT).
Place & duration: This study was conducted in Physiotherapy Department and Rehabilitation center at Mayo Hospital Lahore.The duration of study was 4 months after approval of synopsis.
Methodology: In 'group A' Static stretching is applied while in 'group B' Hold Relax technique of PNF was applied, while in 'group C' conventional physiotherapy was applied. Allocation of patients in two groups had done by computerized generated list. All groups will also receive conventional therapy, which will remain same throughout the study. The conventional therapy will include: Heating pad for 15 minutes, Hamstring isometric exercises, Ankle pumps exercise, Hamstring self-stretches [toe touching while standing or long sitting].Group A will receive static stretching for hamstring muscles while group B will receive PNF hold relax technique, group C will be benefited by the conventional physiotherapy. Treatment frequency will be 3 times a week. The duration of treatment will be 2 weeks in both groups.
Results: Pair 1 had shown that the pre and post treatment comparison of Numeric pain rating scale mean score of pair 1 of group A before treatment was 7.5±1.083 which improved to 5.5±1.56. Pre and post treatment comparison of pair 2 of group B had showed that mean score before treatment was 7.6± 1.23 which was improved to 2.2±1.48. Pair 3 of group C improved from 8.3±0.778 to 4.8±1.02.
Conclusion: The findings of this study led to the conclusion that static stretching is superior to the hold-relax strategy for treating hamstring stiffness. It lessens pain and enhances muscle function and flexibility.
Keywords: Hold relax technique, hamstrings flexibility, static stretching

INTRODUCTION

Hamstring consists of three muscles on the back of the thigh. These are three muscles from medial to lateral: Semimembranosus, Semitendinosus, Biceps femoris. These are two joint muscles originating from ischial tuberosity and having their insertion on tibia and fibula[1].

The hamstrings are quite susceptible to strain and injury[2]. Hamstrings injury can be due to a pull, complete or partial tear. This injury must be graded according to their severity. A GRADE 1 tear can be mild, GRADE 2 tear can be moderate and GRADE 3 tear can be due to complete tear or rupture of the muscle and requires months to heal[3].

Muscle "tightness" is due to an increase in tension from active or passive mechanisms. Passively, muscles can become shortened due to postural adaptation actively; muscles can become shorter because of spasm or contraction[4,5]. Decreased flexibility may cause muscle contraction and joint dysfunction, which restricts range of motion (ROM). Subjects with muscle tightness may perform less well in daily activities and sports[6].

Flexibility is defined as the length of the muscles that cross the joints to produce a bending action and the range of motion in a joint or group of joints[7].

The idea of flexibility suggests that while some joints are more flexible than others, it is not joint-specific. Flexibility lowers or eliminates the risk of muscular injury by allowing tissue to adapt to stress and strain more readily[8,9].

Low back problems may have increased hamstring stiffness as a contributing factor. Movement limitations or postural asymmetries probably cause the lumbar spine to compensate, which in turn increases stress on the spinal soft tissues and raises the risk of low back pain[10,11].

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According to clinical observations, hamstring tightness affects the lumbar pelvic rhythm and may be linked to changes in the spinal curvatures during trunk flexion[12].

Certain postural habits are detrimental to the body and joint mechanics causing different impairments, one of these is the sitting habits in a slouched position causing disturbances in the pelvic tilting which in turn causes the soft tissues to overstretch. Moreover, it also contributes towards the tightness of posterior thigh muscles-the hamstring muscles. In order to improve back pain in younger client's hamstrings flexibility is very important to maintain. Because hamstring muscles run from the back of thigh to the back of knee, they are common contributor towards lower back pain. Stretching hamstring would be beneficial in treating low back pain due to the hamstring tightness. It can be maintained by various conventional methods as well as by different stretching techniques[13,14].

The most popular strategy for lengthening muscles by stimulating the Golgi-tendon organ through autogenic inhibition is static stretching, and numerous research have demonstrated its effectiveness[15].

Holding relax strategy grows by lengthening the muscle and boosting the effectiveness of the neuromuscular system. Stretching Increase the flexibility of the periarticular connective tissue and the muscular tendon unit to increase joint ROM. Restore proper neuromuscular balance between muscle groups, lessen joint surface compression, and lower injury risk[16,17].

Muscular tightness is the most prevalent disorder in healthy, normally posed people as a result of postural misalignment, muscle imbalances, poor muscle function, and sedentary lifestyle. The rear of the leg is covered by a long, strong set of muscles known as the hamstrings[18]. Based on its simplicity and ability to expand range of motion, static stretching is the most common type

of stretching, but dynamic stretching is more advantageous before a performance[19].

Poor hamstring flexibility is a very debilitating problem among people. Increased hamstring tightness has been associated with injuries to low back pain which is a very familiar problem in all age groups. Hamstring tightness causes dysfunctions depending upon severity of tension. It may enhance pain and leads to functional dependency.

Physical therapy is important in the management of muscular flexibility by interventions including heat therapy, ultrasound, infrared radiations, and in some cases manual therapeutic maneuvers. This study provided an opportunity to share my personal experience with community.

This study was conducted purely in clinical setting of Physiotherapy Department and rehabilitation center of Mayo Hospital, Lahore. The outcome of this study is of great value in treating hamstrings tightness which is a great contribution to the health care system of Pakistan.

MATERIALS AND METHODS

The study design was Randomized Controlled Trial (RCT).This study was conducted in Physiotherapy Department and Rehabilitation center at Mayo Hospital Lahore.The duration of study was 4 months after approval of synopsis. Each patient was treated for 4 weeks.Sample size was calculated by power.A total of 36 patients was included, which was divided into three groups [12 in group A, 12 in group B, 12 in group C]. Inclusion criteria was age 20-45 years ,both male and female,hamstring tightness,patients having nonspecific low back pain and patients positive for 90-90 SLR and tripod test while Exclusion criteria was fracture of lower limb,previous traumatic injury to hamstring tendons, pregnancy, vertebral fractures, spinal surgery, systemic or inflammatory conditions and cancer patients any red flag.

Data Collection Procedure: The inclusion and exclusion criteria for the treatment of hamstring tightness were followed in the conduct of this study. Prior to beginning patient therapy, agreement was obtained using a consent form. The examination included data which had subjective and objective examination. Demographic details such as age, gender, socioeconomic status, marital status, and the beginning, nature and length of the problem will be included in the data. Thirty-six patients were selected for this purpose. Group A (Static Stretching) received static stretching technique a 20-30 sec stretch force was applied followed by 10 sec rest period along with conventional physical therapy treatment. Group B (Hold Relax) was treated with PNF hold relax technique a passive stretch force for 20 sec, isometric contraction for 15 sec followed by relaxation period along with conventional treatment.Group Creceived heating pad for 15 minutes. Hamstring isometric exercises, ankle pumps, Leg circulation exercises/general range of motion exercises and Hamstring self-stretches (toe touching while standing or long sitting).

The data was gathered following the therapist's physical examination. Both subjective and objective examinations are included. Age, ethnicity, past medical history, economic background, parental status, level of education, length of onset, nature, and location of symptoms are among the demographic details included in the data. The NPRS is a relevant and dependable tool for assessing pain. The Functional Assessment Scale for Hamstring Injury was used to conduct the final evaluation (FASH). A disease-specific questionnaire has just been created, the Functional Assessment Scale for Hamstring Injuries. A disorder questionnaire called the FASH questionnaire has recently been created to help patients with hamstring tightness rate the severity of their symptoms (pain and function). It has ten questions that are used to evaluate patients.

Ethical consideration: Patient information should be confidential and privacy of the patient should be considered. In the development of research, plan moral values and ethical values should be observed.

RESULTS

Table 1 **s**hows the demographics data of groups A,B and C. Total 36 participants were included in this study. Distribution of cases according to gender in group A has showed out of 12(100%) subjects, 4 was male and 8 were females, For group B was 9 females and 3 males, C were 7 females and 5 males. The mean age distribution were A was 35.83±8.11, B was 32.17±7.94 and C was 36.42±3.81 respectively. Table 2 depicts the pre and post treatment mean scores of groups. Mean score of pair 1 of group A before treatment was 7.5±1.083 which improved to 5.5±1.56. Pre and post treatment comparison of pair 2 of group B has showed that mean score before treatment was 7.6±1.23 which was improved to 2.2±1.48. Pair 3 of group C improved from 8.3 ±0.778 to 4.8 ±1.02. pre and post treatment comparison of FASH SCALE Mean score of pair 1 of group A before treatment was 31.33±9.66 which improved to 68.75±5.98. Pre and post treatment comparison of pair 2 of group B has showed that mean score before treatment was 25.83±7.27 which was improved to 78.58±6.09. Pair 3 improved from 20.08±5.05to 59.58±4.75 with significant value of 0.00 which is less than 0.05.

Table 3 shows post treatment scores of NPRS and FASH between and within the groups showing the significant p-value of 0.00 having less than 0.005.

Table 1: Descriptive statistical analysis of groups (n=36)

	Group A		Group B		Group C	
	Male	Female	Male	Female	Male	Female
Gender	4	8	3	9	6	7
Age	35.83± (8.11)		32.17± (7.94)		36.42± (3.81)	

Table 2: Pre and post treatment mean scores of groups (n=36)

Outcomes	Group A		Group B		Group C		p-value
	Pre value	Post value	Pre value	Post value	Pre value	Post value	
NPRS	7.58± 1.08	5.50 ±1.56	7.66± 1.23	2.25 ±1.48	8.33 ±0.78	4.83± 1.02	0.00
FASH	31.3 ±9.66	68.7 ±5.98	25.8 ±7.27	78.5 ±6.09	20.08 ±5.05	59.5± 4.75	0.00

Table 3: Post treatment scores of groups (n=36)

Outcomes		Sum of Squares	df	Mean Square	F	Sig.
Post treatment NPRS	Between groups	70.722	2	35.361	18.547	.000
	Within groups	62.917	33	1.907		
	Total	133.639	35			
Post treatment FASH	Between groups	2166.889	2	1083.444	33.984	.000
	Within groups	1052.083	33	31.881		
	Total	3218.972	35			

DISCUSSION

The present examination was done to check the efficacy of static stretching and hold relax technique for the treatment of hamstrings flexibility. We have applied three types of treatment interventions among 36 patients with equal division. Group A had received static stretching and group B received hold relax technique while Group C was given conventional physical therapy protocol. Similarly, 12

patients were allocated to each group. Our aim was comparing the results to determine which treatment technique was better.

For this purpose, we had used Numeric Pain Rating Scale and FASH functional assessment for hamstring injury. Proper consent was taken from each patient. This study program consisted of 3 sessions per week and in total there were 12 sessions. Follow up was also taken to check improvements in results.

After 4 weeks, we noticed that there was quite alleviation of symptoms like pain, tightness and improvement in the physical activity. The patients that received PNF hold relax technique felt a large improvement in complains like decreased functional and physical activity as compared with participants that were allocated to other training group.This study calculated results of treatment effects. A considerable difference was found between the results of groups. The participants who received therapeutic interventions performed well in all the aspects of physical activity.

One study determines from aged 18 to 30, the seventy subjects were randomly assigned to one of two stretch groups and were not very flexible in their hamstrings. Static stretching was used on Group A, and the hold-relax technique was used on Group B. The left leg served as the control and received no treatment. Pre and post stretch intervention ranges of motion for the right leg were measured. To determine if hold relaxed and static stretches were beneficial in relieving hamstring tightness, data were analyzed using paired sample t-test and independent sample t-test. After signing a consent form, asymptomatic subjects with tight hamstrings were enrolled in the study using a self-made questionnaire[20].

Our study sample size was less than that of study mentioned above. Our study depicts that hold relax was more effective than static stretching.

One study determines 30 young female students from Clinic of Riphah International University who had hamstring tightness and at least a 10-degree deficit from the test's 180-degree Active Knee Extension (AKE) reading. Participants were divided into the treatment and control groups at random using a lottery system. In both groups, the leg that displayed the most tightness was designated as the treatment limb. Pretreatment readings for both groups were noted after a five-minute warm-up.Then, the treatment group underwent cryostretching, whereas the control group had static stretching[21].

Our study compares the static stretching withhold relax technique and no of participants were 36 while the study group involved received static stretching withcryostretching.

CONCLUSION

Proprioceptive neuromuscular facilitation technique Hold relax is more effective in improving functional activities, reducing pain and improving flexibility as compared to static stretching technique in the management of hamstrings tightness.

Competing interests: Nil

REFERENCES

1. O'Reilly MK, Reese S, Herlihy T, Geoghegan T, Cantwell CP, Feeney RN, et al. Fabrication and assessment of 3 D printed anatomical models of the lower limb for anatomical teaching and femoral vessel access training in medicine. Anatomical sciences education. 2016;9(1):71-9.
2. Lambers K, Ootes D, Ring D. Incidence of patients with lower extremity injuries presenting to US emergency departments by anatomic region, disease category, and age. Clinical Orthopaedics and Related Research®. 2012;470(1):284-90.
3. Nilstad A, Andersen TE, Bahr R, Holme I, Steffen K. Risk factors for lower extremity injuries in elite female soccer players. The American journal of sports medicine. 2014;42(4):940-8.
4. Jing E, O'Neill BT, Rardin MJ, Kleinridders A, Ilkeyeva OR, Ussar S, et al. Sirt3 regulates metabolic flexibility of skeletal muscle through reversible enzymatic deacetylation. Diabetes. 2013;62(10):3404-17.
5. Chen C-H, Nosaka K, Chen H-L, Lin M-J, Tseng K-W, Chen TC. Effects of flexibility training on eccentric exercise-induced muscle damage. Medicine & Science in Sports & Exercise. 2011;43(3):491-500.
6. Sbardelotto GAEB, Weisshahn NK, Benincá IL, de Estéfani D, e Lima KMM, Haupenthal A. Hold-relax PNF is more effective than unilateral lumbar mobilization on increasing hamstring flexibility: A randomized clinical trial. Journal of Bodywork and Movement Therapies. 2022.
7. van der Horst N, van de Hoef S, Reurink G, Huisstede B, Backx F. Return to play after hamstring injuries: a qualitative systematic review of definitions and criteria. Sports Medicine. 2016;46(6):899-912.
8. Gallon D, Rodacki A, Hernandez S, Drabovski B, Outi T, Bittencourt L, et al. The effects of stretching on the flexibility, muscle performance and functionality of institutionalized older women. Brazilian Journal of Medical and Biological Research. 2011;44(3):229-35.
9. Micheo W, Baerga L, Miranda G. Basic principles regarding strength, flexibility, and stability exercises. Pm&r. 2012;4(11):805-11.
10. Sandler RD, Sui X, Church TS, Fritz SL, Beattie PF, Blair SN. Are flexibility and muscle-strengthening activities associated with a higher risk of developing low back pain? Journal of science and medicine in sport. 2014;17(4):361-5.
11. Lowther D, O'Connor A, Clifford A, O'Sullivan K. The relationship between lower limb flexibility and hamstring injury in male Gaelic footballers. Physiotherapy Practice and Research. 2012;33(1):22-8.
12. Consmüller T, Rohlmann A, Weinland D, Druschel C, Duda GN, Taylor WR. Comparative evaluation of a novel measurement tool to assess lumbar spine posture and range of motion. European Spine Journal. 2012;21(11):2170-80.
13. Schelldorfer S, Ernst MJ, Rast FM, Bauer CM, Meichtry A, Kool J. Low back pain and postural control, effects of task difficulty on centre of pressure and spinal kinematics. Gait & posture. 2015;41(1):112-8.
14. Berenshteyn Y, Gibson K, Hackett GC, Trem AB, Wilhelm M. Is standing balance altered in individuals with chronic low back pain? A systematic review. Disability and rehabilitation. 2019;41(13):1514-23.
15. Behm DG, Chaouachi A. A review of the acute effects of static and dynamic stretching on performance. European journal of applied physiology. 2011;111(11):2633-51.
16. Miyahara Y, Naito H, Ogura Y, Katamoto S, Aoki J. Effects of proprioceptive neuromuscular facilitation stretching and static stretching on maximal voluntary contraction. The Journal of Strength & Conditioning Research. 2013;27(1):195-201.
17. Puentedura EJ, Huijbregts PA, Celeste S, Edwards D, In A, Landers MR, et al. Immediate effects of quantified hamstring stretching: hold-relax proprioceptive neuromuscular facilitation versus static stretching. Physical Therapy in Sport. 2011;12(3):122-6.
18. Bhutada G, Golhar S, Takalkar AA. A Comparative Study on Effect of Non-Ballistic Active Knee Extension in Neural Slump Position Versus Post Isometric Relaxation Techniques on Hamstring Flexibility in Sedentary Workers. Indian Journal of Physiotherapy & Occupational Therapy. 2022;16(4):24-9.
19. Wynn Jr KL. Acute Effects of Lacrosse Ball Self-Myofascial Release and Static Stretching on Hamstring Flexibility: Tennessee Technological University; 2022.
20. Kompal R, Ul-Islam S, Bhatti U, Tahir K, Noor R, Kashif M. Effects of static stretch versus hold relax in improving flexibility of tight hamstrings. Rehman Journal of Health Sciences. 2022;4(1):36-40.
21. Naz S, Riaz S, Javed MA, Khan RR, Muneeb HN, Sulman M. Comparative Study for Effectiveness of Cryostretching and Static Stretching on Hamstring Flexibity in Young Females. Pakistan Journal of Medical & Health Sciences. 2022;16(04):1216