



A STUDY TO ANALYSE THE EFFECTIVE TECHNIQUE TO REDUCE HAMSTRING TIGHTNESS AMONG FOUR TECHNIQUES IN FEMALE PHYSIOTHERAPY STUDENTS

***V.RAJALAXMI**¹, **K.ANUSIYA**², **S.RAMACHANDRAN**³, **G.YUVARANI**⁴

¹ Vice Principal Faculty of Physiotherapy, Dr. M.G.R. Educational & Research Institute University, Velappanchavadi, Chennai - 600 077, Tamil Nadu, India.

² Physiotherapist, Dr. M.G.R. Educational & Research Institute University, Velappanchavadi, Chennai - 600 077, Tamil Nadu, India

³ Associate Professor, Faculty of Physiotherapy, Dr. M.G.R. Educational & Research Institute University, Velappanchavadi, Chennai - 600 077, Tamil Nadu, India.

⁴ Assistant Professor, Faculty of Physiotherapy, Dr. M.G.R. Educational & Research Institute University, Velappanchavadi, Chennai - 600 077, Tamil Nadu, India.

ABSTRACT

Flexibility in hamstrings muscle group is necessary for the hip and knee movements as well as in many functional activities and in prevention of injury in which muscle group is elongated over hip and knee simultaneously. The purpose of the study is to compare the effect of four types of hamstring stretching on hamstring tightness. Flexibility is an ability to move a single joint or a series of a joint smoothly and easily through and unrestricted, pain free range of motion. The hamstring muscle group is necessary for knee & hip movement as well as in many functional activities and in prevention of injury in which muscle group is elongated over the hip and knee simultaneously. Many factors influences an individual's flexibility like age, race, gender, tissue temperature strength training, stiffness and warm up have influenced flexibility. A proper stretching program is key to improving flexibility. To get maximum flexibility it must be repeated 5 times per day for 2 sessions /day, 5 days/ week for 4 weeks. In the experimental study a total of 60 samples were selected by simple random sampling method who met the inclusion criteria out of 100 healthy young female individuals between the age group of 18-21 years who volunteer themselves for the study [15 individual in each group]. Group A: 90-90 Passive stretching, Group B: 90-90 Active stretching, Group C: PNF stretching, Group D: Self stretching. It's a Comparative study, Pre and post test design conducted among female Physiotherapy students in Dr.MGR. Educational and Research Institute University. On comparing mean value of four groups on active knee extension test (AKET) shows significant reduction in the post test mean but Group C PNF stretching (hold relax) shows (16.57) lower mean value is more effective than other three groups at $***p \leq 0.0001$. Hence alternate hypothesis is accepted.

KEYWORDS: Active stretching, Passive stretching, PNF, AKE, Hamstring tightness.



***V.RAJALAXMI**

Vice Principal Faculty of Physiotherapy, Dr. M.G.R. Educational & Research Institute University, Velappanchavadi, Chennai - 600 077, Tamil Nadu, India.

*Corresponding Author

Received on: 02-01-2017

Revised and Accepted on 23-02-2017

DOI: <http://dx.doi.org/10.22376/ijpbs.2017.8.2.b307-310>

INTRODUCTION

Flexibility is an ability to move a single joint smoothly and easily through an unrestricted pain free range of motion.¹ Flexibility in the hamstring muscle group is necessary for the hip and knee movements as well as in many functional activities and in prevention of injury in which the muscle group is elongated over the hip and knee simultaneously.² The muscle length in conjunction with joint integrity and extensibility of the perpendicular soft tissue determine flexibility.³ Muscular flexibility is an important aspect of normal human function.⁴ Loss of flexibility is partly due to age related changes in connective tissue and muscle, partly due to decreasing levels of activities. A regular stretching program can improve flexibility at any age.⁵ Stretching is used to increase mobility of soft tissues and subsequently improve ROM by elongating structures that have adaptively shortened and have become hypomobile over time.⁶ Muscle tightness is caused by a decrease in the ability of the muscle to deform which results in a decreased ROM in the joint on which it acts. Inability to achieve greater than 160° of knee extension with the hip at 90° flexion are considered as hamstring tightness. Hamstring tightness leads to hamstring injuries, which is the most common type of injury among athletes. These injuries are slow to recover and decrease the performance level of athletes. The flexibility of the hamstring muscle is important in the prevention of injury, muscular and postural imbalance, and maintenance of the joint ROM, optimal musculoskeletal function and enhanced performance in day to day activities. Through systematic examination and evaluation of a patient, a therapist can be able to determine what structures are restricting joint motion and what type of stretching procedures are indicated. For maximum increase in flexibility, stretching has to be given 5 days per week. Proprioceptive Neuromuscular Facilitation (PNF) is an advanced form of flexibility training that involves both the stretching and contraction of the muscle group being targeted. PNF stretching was originally developed as a form of rehabilitation. Various PNF stretching techniques are: Hold Relax, Contract Relax, and Contract Relax Antagonist Contract (CRAC) etc. The Hold Relax (HR) technique involves an isometric contraction of the shortened muscle against maximum resistance followed by a relaxation phase. The contract relax (CR) PNF technique includes the concentric contraction of the shortened muscle and then a relaxation phase while in Contract Relax - Agonist Contract (CRAC) technique isometric contraction of the shortened muscle followed by relaxation and later concentric contraction of the opposing muscle or muscle group. Mohamad Shariff, Mohamad Rezif, Mohamad Ali (2013) AKET showed excellent inter-rater & intra-rater reliability for assessing hamstring flexibility. The AKET is an active test that involves movement at the knee joint & most considers it safe, as the patient dictates the end point of movement & showed a high intra-rater, correlation coefficient.

METHODOLOGY

Once the study is approved by the institutional review board (Ref no: 003/PHYSIO/IRB/2016) board, 100 female

volunteers were recruited from physiotherapy students of DR.MGR Educational and research institute university with hamstring tightness. 60 samples were selected based on the inclusion criteria, Female students with age 18-25 years and excluded male students and those presenting any hip or knee joint pathology, Subject having prolonged back pain, Recent fracture, Dislocation, any surgery. They were fully explained about the study and asked to fill the consent form in acceptance with participation of the study which is duly signed by the participant and the researcher. Age, Sex, Height, Weight, were recorded prior to the testing. Pre-test for hamstring tightness recorded using AKET after that they were divided into four equal groups of 15 each by lottery method received respective stretching. Group A received 90 – 90 Passive stretch, Group B - 90-90 Active stretch, Group C- PNF Stretching [hold relax] and Group D - Self Stretch. Hold all the position for 15 to 20 seconds and relax. The stretch can be repeated up to three times per session. Stretching procedure are demonstrated well to the patient along with do's & don't's on day and continued 2 sessions/day for 5 days a week for 15 sec/stretch for 4 weeks. Each stretch is repeated for 5 counts a day. After 4 weeks post-test is done using AKET and compared with the pre-test.

Outcome measure: Active knee extension test (AKET)

Subjects were assessed for hamstring tightness using the AKE test. The subject placed in supine position with hip and knee flexed in 90 degree. The testing was done on the right lower extremity and subsequently the left lower extremity and the pelvis were strapped down the table to stabilise the pelvis and control any accessory movements. Landmarks used to measure knee range of motion were, lateral condyle of femur. The fulcrum of the goniometer was centred over the lateral condyle of the femur with the proximal arm secured along the femur. The distal arm was aligned with the lower leg using the lateral malleolus as a reference. The hip and knee of the extremity being tested was placed into 90 degree flexion. Maintain hip in 90 degrees of flexion. The subject was then asked to extend the right lower extremity as far as possible until a mild stretch sensation was felt. A full circle Goniometer was then used to measure the angle of knee flexion. Three repetitions were performed and an average of the three was taken as the final reading for knee flexion range of motion (hamstring tightness).

RESULTS

Statistical analysis is done using SPSS software, Version 16.0, On comparing mean values of Group A, Group B, Group C, Group D on active knee extension test shows significant reduction in the post test mean values. But Group C PNF (hold relax) stretching shows (16.57) is effective than other three groups, 90-90 Passive stretching [Group A(21.93)], 90-90 Active stretching [Group B(20.73)], 90-90 Self stretching [Group D(22.13)] at $***P \leq 0.0001$. Group-A (21.13) also show lower mean value than other two groups. Hence alternative hypothesis accepted.

Table I
Data analysis

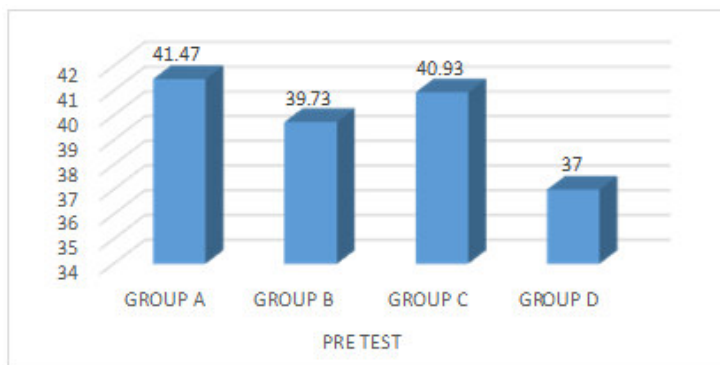
Comparison of active knee extension test with in four groups in pre and post test

GROUPS		*GROUP A	*GROUP B	*GROUP C	*GROUP D	f-TEST	p-VALUE
PRE-TEST	MEAN	41.47	39.73	40.93	37.00	7.29	.539**
	SD	9.85	11.01	10.03	8.38		
POST-TEST	MEAN	21.93	20.73	16.57	22.13	2.95	.040***
	SD	6.45	7.33	5.61	5.91		

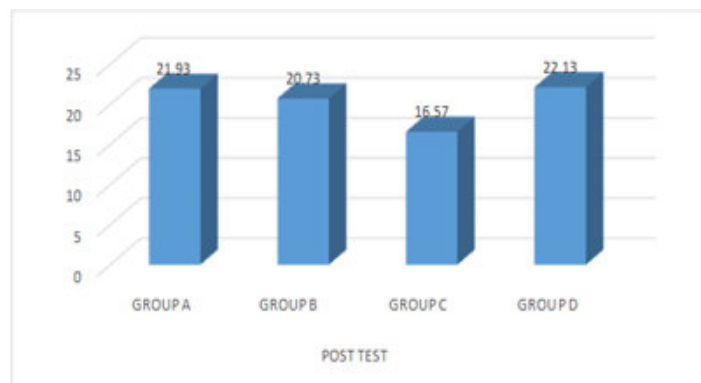
P> 0.001 (Not Significant), *P<0.001 (Significant)

The table shows that significant difference in the post –test values of active knee extension test between four groups. (**P<0.001)

Graph-1
Comparison of active knee extension test with in four Groups in pre test



Graph-2
Comparison of active knee extension test with in four groups in post test



DISCUSSION

The present study was conducted to compare & find out the effective technique to reduce hamstring tightness with in four different techniques among female physiotherapy students. It was noticed that active knee extension test (AKET) parameters showed improvement in all four groups. Group –A 90-90 Passive stretching, Group-B received 90-90 Active stretching, Group-C received PNF (hold relax) stretching, Group-D received Self stretching. NAGARWAL et al (2009) stated that PNF (hold relax) resulting the improving hamstring flexibility and that it is helpful in using it in clinical practice for improving hamstring flexibility. When the intra group (ANOVA) means values of AKET was analyzed. Group-A shows post test mean AKET (21.93), Group-B shows posttest mean AKET (20.73), Group –C shows posttest mean AKET (16.57), Group –D shows posttest mean AKET (22.13) values clearly indicated that there was statistically significant improvement in reducing hamstring tightness in all four groups but Group –C

shows lower mean values in post-test than Group-A, Group-B & Group-D. The Group-C PNF (hold relax) stretching found to be statistically significant difference at ***p<0.05. Secondly Group A (90-90 passive stretching) is effective but Group C PNF stretching (hold relax) is effective when compared to other three Groups.

CONCLUSION

The result of this study reveal that there is significant difference in the post test values of all four groups in normal female college students with hamstring tightness. All four groups (90-90 passive stretch, 90-90 active stretch, PNF stretch, self-stretch) shows improvement in hamstring flexibility. The study concluded hamstring flexibility gains made from PNF Stretching is better than the gains made by other three stretching techniques. Group A (90-90 passive stretching) also shows significant reduction than the other two groups but group C PNF stretching (hold

relax) shows lower mean values and hence more effective than all others. Hence, null hypothesis is rejected and alternate hypothesis is accepted.

Ethical Considerations

The manuscript is approved by the Institutional Review board of faculty of physiotherapy. All the procedures were performed in accordance with the ethical standards of the responsible ethics committee both (Institutional and national) on human experimentation and the Helsinki Declaration of 1964 (as revised in 2008).

REFERENCES

1. Arngem, Prentice WE, MC grew, Hill, Boston (1997): Principles of athletic training ,9 th Ed.
2. Corbin CB, Noble L. Flexibility: A major component of physical fitness. J phys Educ Recreat Dance. 1980; 51:57-60.
3. Bonnar BP, Deivert RG, Gould TE. The relationship between isometric contraction durations during hold-relax stretching and improvement of hamstring flexibility. J Sports Med Phys Fitness. 2004;44:258-61.
4. Bandy WD, Irion JM WD. The effect of time on static stretch on the flexibility of the hamstring muscles. PhyTher .1994sep; 74 (9): 845-50.
5. Beaulieu JE. Developing a stretching program. The physician and sports medicine. 1981 Nov 1; 9(11):59-69.
6. Bacchle TR and Roger W. Earle. Essential of strength training and conditioning human kinetics . 3rded. NIRSA Education & Publication Center : Illinois; 2008.
7. Carolyn Krishna, Lynn Allen. Therapeutic exercise foundation and technique. 5th Ed. F.A. Davis Company: 2007
8. Abdulrahim Zakaria, Ganeswara Rao. Melam and Syamala. Efficacy of Pnf Stretching Techniques on Hamstring Tightness in Young Male Adult Population. World J of Med Sci. 2012; 7 (1): 23-6.
9. Donna C, Boone, Azen,Stanley P et al. Reliability of goniometric measurements. Physical Therapy. 1978. 58(11): 1355-60.
10. Van Mechelen W, Ekstrand J Hlobil H, Kemper H C. Incidence, severity, aetiology and prevention of sports injuries. A review of concepts. Sports Med 1992:1482–99 [PubMed]
11. Funk DC, Swank AM, Mikla BM, Fagen TA, Farr BK. Impact of Prior Exercise on Hamstring Flexibility: A Comparison of Proprioceptive Neuromuscular Facilitation and Static Stretching. Natl Str Cond Assoc J. 2003;17(3):489–92. [PubMed]
12. Garrett WE., Jr Muscle strain injuries. Am J Sports Med. 1996; 24(6 Suppl):S2–S8. [PubMed]

ACKNOWLEDGEMENT

I would like to thank the authorities of DR.MGR Educational and Research Institute University and Principal Faculty of Physiotherapy for providing me with facilities required to conduct the study.

CONFLICT OF INTEREST

Conflicts of interest none.

13. Holl et al .Comparison of active passive and PNF stretching for improving hamstring flexibility. Sports health care. 2012; 44; 81-8
14. Hardy L, Jones D. Dynamic flexibility and proprioceptive neuromuscular facilitation. Res Q. 1986; 57: 150-53.
15. Marek SM, Cramer JT, Fincher AL, Massey LL, Dangel-maier SM, Purkayastha S. Acute effects of static and proprioceptive neuromuscular facilitation stretching on muscle strength and power output. J. Athletic Training 2005; 40: 94–103.
16. C.M. Norris M. Matthews. Inter-tested reliability of self monitored active knee extension test .Journals of body work & movement therapy.2005 ;9:256-9.
17. .Osternig LR, Robertson RN, Troxel RK, Hansen P. Differential responses to proprioceptive neuromuscular facilitation (PNF) stretch techniques. Med Sci Sports Exerc.1990; 22:106-11.
18. Prentice WE. A comparison of static stretching and PNF stretching for improving hip joint flexibility. J Athl Train.1983; 18:56-9.
19. Rajalaxmi et al. Effectiveness of mulligan’s two leg rotation and bent leg Raise techniques in subjects with acute non specific low back Pain in improving hamstrings flexibility. International journal of physiotherapy and occupational therapy.2015 Dec ;(1), 2,29-36.
20. Sullivan MK, DeJulia JJ, Worrell TW. Effect of pelvic position and stretching method on hamstring muscle flexibility. Med Science Sports Exercise. 1992; 24:1383-9.
21. Tanigawa MC. Comparison of the hold relax procedure and passive mobilization on increasing the muscle length. Phys Ther.1972; 52:725-35.
22. Worrell TW, Smith TL, Winegardner. J. Effect of hamstring stretching on hamstring muscle performance. J. Orthop Sports PhysTher. 1994; 20:154-9.
23. Kotteeshwaran.k et al.Effect of PNF stretching and DSTM on hamstring flexibility in subjects with LBA. Int j pharm Bio sci.2014; 5(3): B 228-33.

Reviewers of this article

Dr. C. V. Senthil Nathan, MPT

Principal & Faculty of Physiotherapy, Dr.
MGR Educational & Research Institute
University, Chennai, India



Prof. Y. Prapurna Chandra Rao

Assistant Professor, KLE University,
Belgaum, Karnataka



Prof. Dr. K. Suriaprabha

Asst. Editor, International Journal
of Pharma and Bio sciences.



Prof. P. Muthuprasanna

Managing Editor, International
Journal of Pharma and Bio sciences.

We sincerely thank the above reviewers for peer reviewing the manuscript