Available online at http://www.journalcra.com

International Journal of Current Research
Vol. 9, Issue, 12, pp.62816-62819, December, 2017

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

ISSN: 0975-833X

RESEARCH ARTICLE

EFFECT OF MUSCLE ENERGY TECHNIQUE VS EFFECT OF NEURAL TISSUE MOBILIZATION ON HAMSTRING TIGHTNESS IN YOUNG ADULTS

[1,*]Dr. Ujwal L, Yeole, [2]Raaequa, M. Awati and [3]Dr. Pournima, A. Pawar

[1]Asso Prof and Principal, Dept of Physiotherapy, Tilak Maharashtra Vidyapeeth, Pune
[2]Intern, Dept of Physiotherapy, Tilak Maharashtra Vidyapeeth, Pune
[3]Assistant professor, Dept of Physiotherapy, Tilak Maharashtra Vidyapeeth, Pune

ARTICLE INFO

Article History:
Received 27th September, 2017
Received in revised form
12th October, 2017
Accepted 22nd November, 2017
Published online 27th December, 2017

Key words:
Hamstring flexibility,
Muscle Energy Technique,
Neural Tissue Mobilization,
Active Knee Extension test,
Straight Leg Raise test,
Finger to Toe test.

ABSTRACT

Background: Muscular tightness is frequently postulated as an intrinsic risk factor for the development of a muscle injury. Lack of flexibility has been suggested as a predisposing factor to hamstring strains.

Aim and objective: To compare the effect of Muscle Energy Technique and Neural Tissue Mobilization technique for improving hamstring flexibility.

Methodology: Total 100 Young Individuals aged 18 to 35 years were evaluated for Hamstring tightness. Amongst these 60 individuals satisfying inclusion criteria were recruited and randomly allotted into two groups Muscle Energy Technique (Group A, n=30, mean age 24.73 ±4.53 yrs) and Neural Tissue Mobilization (Group B, n=30, mean age 24.3±4.21yrs). All participants were assessed for hamstring tightness and pre and post intervention using Active Knee Extension (AKE) test, Straight Leg Raise (SLR) and Finger to Toe Touch (FTT) test. The intervention was carried out for three session/week for four weeks.

Results: At the end of four weeks, for Group A, the AKE reduced from 49.3±4.8 to 36.33±6.86, SLR improved from 54.1±15.36 to 73.43±9.30, whereas FTT reduced from 61±2.66 to 6.55±2.26.
For Group B the AKE reduced from 42.53±7.77 to 30.93±4.46, SLR improved from 57±12.15 to73.56±5.84, whereas FTT reduced from 7.45±2.75 to 5.6±2.17. Between the groups comparison, Group A showed higher improvements in AKE (P<0.0001), SLR (P<0.0001) and FTT (P=0.0002) as compared Group B.

Conclusion: Muscle Energy Technique and Neural Tissue Mobilization techniques showed significant improvement in hamstring flexibility. Muscle Energy Technique is more effective than Neural Tissue Mobilization for improving hamstring flexibility in young adults.

Citation: Dr. Ujwal L, Yeole, Raaequa, M. Awati and Dr. Pournima, A. Pawar, 2017. "Effect of Muscle Energy Technique Vs Effect of Neural Tissue Mobilization on Hamstring Tightness In Young Adults", *International Journal of Current Research*, 9, (12), 62816-62819.

INTRODUCTION

Flexibility is a vital component of fitness required for most desirable musculoskeletal functioning and maximizing the performance of physical activities.[i] Flexibility dysfunction is a widespread problem faced by common as well as sportspersons, especially in case of hamstring group of muscles.[iiiii]Hamstring tightness is not only a causative factor for reduced range of motion but it can also lead to various other musculoskeletal problems.[iv] Length‐tension' relationship of muscle as well as shock absorbing ability of the limb is affected by tightness of muscle. Modern sedentary style of living is one of the main reasons for postural abnormalities evident in modern society.

Corresponding author: **Dr. Ujwal L, Yeole,**
[1]Asso Prof and Principal, Dept of Physiotherapy, Tilak Maharashtra Vidyapeeth, Pune.

The prolonged sitting hours required in most of the jobs, and educational setups can affect flexibility of soft tissues, especially two joint muscles.[v] Reduced flexibility found to generate vicious circle of range reduction and resulting increase in postural problems. Tight muscles also found to compress the blood vessels and lead to reduced optimal performance.[5]Studies have found various factorswhich lead to the development of hamstring tightness such as genetic predisposition, injury to muscle, and adaptive shortening due to some chronic condition.[vi] The main reason of muscular tightness is a reduction in ability of muscle to deform, leading to a lower range available at concerned joint for motion.[vii] Tight hamstrings are associated with a dysfunctional motor control pattern leading to a submaximal firing pattern of postural muscles resulting in function of hamstrings as stabilizers rather than their main function of prime movers. This change in primary function leads to the presentation of

hamstring tightness.[viii]Hamstring strain is one of the most commonly suspected complaints resulting from hamstring tightness.[ix] According to Gajdosik et al. 2011, pelvic as well as thoracic angle and range of motion are affected by hamstring flexibility in forward bending. Hamstring tightness also influences the lumbar pelvic rhythm[x], associated with the development of plantar fasciitis[xi] as well as patellar tendinopathy and patellofemoral pain syndrome[xii]. An association between hamstring tightness and mechanical low back pain is also found in studies showing a positive correlation between hamstring tightness and severity of low back pain[xiii].Numerous stretching techniques have been developed, reported and applied by physical therapists, coaches and athletic trainers, which may include Ballistic stretching, Static stretching, PNF stretching, Neurodynamic sliding etc. These methods have been shown to increase ROM immediately after stretching. Flexibility can be enhanced by simple, non-surgical procedures like stretching the shortened muscles. Stretching techniques such as cyclic stretching, isometric exercise proprioceptive neuromuscular facilitation and static stretching have been used to enhance muscular flexibility.

Post isometric relaxation (PIR) Muscle Energy Technique has been utilized in lengthening of tight muscles. The term PIR refers to the subsequent reduction in tone of the agonist muscle after isometric contraction. This occurs due to stretch receptors called Golgi tendon organs that are located in the tendon of agonist muscle.[xiv]The muscle flexibility is found to be influenced by not only its elasticity but also by the nervous tissue extensibility. The tight hamstring may also attribute to altered neural tissue mobility also referred as altered neurodynamic affecting the sciatic and tibial nerve. Neurodynamicintervention, termed as neural mobilization or nerve glide stretches in which the nervous system is made taut and then slack. These interventions are thought to decrease neural mechanosensitivity by providing movement that lead to changes in the neurodynamics and modification of sensation, and help to explain the observed increase flexibility.There is lack of literature comparing the effect of Muscle Energy Technique and Neural Tissue Mobilization on hamstring tightness in young individuals.

Aim and objectives

Aim: To compare the effect of Muscle Energy Technique and Neural Tissue Mobilization on hamstring tightness in young individuals.

Objectives:

- To determine effect of Muscle Energy Technique on hamstring tightness.
- To determine effect of Neural Tissue Mobilization on hamstring tightness.
- To compare the effect of post isometric relaxation and neural tissue mobilization on hamstring tightness in young individuals.

MATERIALS AND METHODOLOGY

The study design was an experimental studywith target population of young individuals having hamstring tightnessrecruited fromvarious departments atTilak Maharashtra Vidyapeeth University. Total 100 Young Individuals aged 18 to 35 years were evaluated for Hamstring tightness (>15- 30 degrees loss of knee extension as measured with the thigh held at 90 degrees of hip flexion). Amongst these 60 individuals satisfying inclusion criteriawere recruited for the study. Those who reported history of trauma (acute or chronic) of lumbar spine, pelvis, hip and knee, recent history of infective arthropathy at hip or knee joint, Lumbar radiculopathy were excluded. Further participants were randomly allotted into two groups Muscle Energy Technique (Group A n=30) and Neural Tissue Mobilization (Group B n=30). All participants were assessed for hamstring tightness pre and post intervention using Active Knee Extension (AKE) test, Straight Leg Raise (SLR) and Finger to Toe Touch (FTT) test.

Muscle Energy Technique

The subjects of Group A received Muscle Energy Technique.The subjects were asked to be in supine position with their non-dominant lower extremity strapped down the table. Pre-determined time intervals for stretching, contracting and relaxing were used to standardize the method utilizing a stop watch. For each stretch, the therapist stretched the hamstring muscle by passively flexing the hip with knee fully extended, allowing no hip rotation. The dominant leg was rested on the therapist right shoulder. The hamstring muscle was stretched until the subject first reports a mild stretch sensation; this position was held for 7 sec. The participant was then instruced to isometrically contract the hamstring muscle for 3 sec by attempting to push his leg down towards the table against the resistance of the therapist. Following this, the participant was asked to relax for 5 sec. The therapist then passively stretched the muscle until a mild stretch sensation is reported. This stretch was held for 7sec. This sequence was repeated 3 times with each sequence separated from each by a 20 second interval. The treatment was given for 3 times per week for period of 4 weeks.

Neural Tissue Mobilization

Group B Subjects underwent sciatic Neural Tissue Mobilization. The subjects were in supine position with their cervical and thoracic spine maintained in flexion. Sliders involve the application of movement/ stress to the nervous system proximally while releasing movement/ stress distally and then reversing the sequence. Concurrent hip and knee flexion were alternated dynamically with concurrent hip and knee extension. The therapist alternated the combination of movement depending on the tissue resistance level. This combination of movements was performed for 30 seconds, 3 times on their leg; the treatment was given for 3 times per week for period of 4 weeks.

Active Knee Extension

The hamstring tightness was evaluated using Standardized method of AKE test. [xv] In this the pelvis was strapped down the table to stabilize the pelvis and control any accessory movements. Landmarks used to measure hip and knee range of motion included greater trochanter, lateral condyle of femur and lateral malleolus which were marked by a skin permanent marker. The fulcrum of the goniometer was centred over the lateral condyle of the femur with the proximal arm secured along the femur using greater trochanter as a reference. The distal arm was aligned with the lower leg using the lateral malleolus as a reference. Then subject was asked to extend the

right lower extremity as far as possible until a mild stretch sensation was felt. A goniometer was used to measure the angle of knee flexion.

Straight Leg Raise

The test was carried out with the subject lying supine on a table with lower limbs extended and feet relaxed. The therapist controlled the position of the trunk and pelvis visually and with palpation, then raised the subject's right lower limb slowly to the point the subject felt resistance in hamstring muscles. Thethe range of hip flexion was assessed using goniometer.

Finger to Toe test

The subjects were asked to keep the knees completely extended, and, from then on, to flex the trunk towards the toe, with head and arms relaxed. Final flexion position was indicated by a sensation of muscular tension that caused great HM discomfort and, in this moment, pictures were taken. Individuals that could reach a distance smaller than 10 cm in relation to the toes were classified as with normal flexibility, and the ones who stayed beyond the distance of 10 cm from the ground were classified as with reduced flexibility. Fingertips distance from the toes (in cm) was measured based a known linear measure, placed on the same visual field from the individuals. The subjects were reminded to keep their knees extended.

Table 1. Pre and Post intervention measures

Groups		Group A (MET n=30)	Group B (NTM n=30)
Age in years (mean±SD)		24.73±4.53	24.3±4.21
Gender		13 males,17 females	15 males,15 females
AKE in degrees (mean±SD)	Pre	49.3±4.8	42.53±7.77
	Post	36.33±6.86	30.93±4.46
	P value	<0.0001	<0.0001
SLR in degrees (mean±SD)	Pre	54.1±15.36	73.43±9.30
	Post	57±12.15	73.56±5.84
	P value	<0.0001	<0.0001
FTT in cms	Pre	8.61±2.66	7.45±2.75
(mean±SD)	Post	6.55±2.26	5.6±2.17
	P value	0.0002	0.0002

RESULTS

Total 100 Young Individuals aged 18 to 35 years were evaluated for Hamstring tightness. Amongst these 60 individuals satisfying inclusion criteria were recruited and randomly allotted into two groups Muscle Energy Technique (Group A, n=30, mean age 24.73 ±4.53 yrs) and Neural Tissue Mobilization (Group B, n=30, mean age 24.3±4.21yrs).Muscle Energy Technique and Neural Tissue Mobilization techniques both showed immediate improvement in hamstring tightness which was reflected by increase in active knee extension and straight leg raise and finger toe test. (Table 1)

DISCUSSION

At the end of four weeks, for Group A, the AKE reduced from 49.3±4.8 to 36.33±6.86, SLR improved from 54.1±15.36 to 73.43±9.30, whereas FTT reduced from 61±2.66 to 6.55±2.26. In Group A, the AKE showed significant improvement suggesting improved hamstring flexibility. Possible explanation for the improved hamstring flexibility could be because of viscoelastic nature of the muscle.Knott and Voss proposed that the Golgi tendon organ is a nerve receptor found in tendons that fires when tension increases in the tendon. This tension can be due to stretch or contracting muscle. When the golgi tendon organ fires a signal is sent to the spinal cord causing the agonist muscle to relax.[xvi] For Group B the AKE reduced from 42.53±7.77 to 30.93±4.46, SLR improved from 57±12.15 to73.56±5.84, whereas FTT reduced from 7.45±2.75 to 5.6±2.17 suggesting significant improvement in hamstring flexibility.This is in accordance to "Sensory theory" proposed by Weppler and Magnusson which suggested that muscle flexibility and its response to sudden stretch have more to do with perceptions of stretch and pain than the biomechanical effects of muscle tissue itself.[xvii] This proposal was supported in a study by Aparicio and colleagues which demonstrated that a suboccipital muscle inhibition technique altered hamstring flexibility when compared to a placebo intervention. The fact that such a distant technique (suboccipital region) could have an immediate effect on the flexibility in the hamstrings may tend support to the "Sensory theory" limiting flexibility of the posterior thigh structures. It seems reasonable to attribute the observed increase in hamstring tissue flexibility following the suboccipital muscle inhibition technique to changes in the subject's perception of stretch or pain.[xviii] Neurodynamics encompasses interactions between mechanics and physiology of the nervous system. Changes in neural mechanics or physiology may lead to pathodynamics. Altered posterior lower extremity neurodynamics could arguably influence resting muscle length and lead to changes in the perception of stretch or pain.

Providing movement or stretching could lead to changes in the neurodynamics and modification of sensation and could help to explain the observed increase in flexibility. The mechanosensitivity of the neural structures in the posterior leg, thigh, buttock, and vertebral canal may play a part in determining the flexibility of the hamstring muscles. Protective muscle contraction of the hamstring muscles found in the presence of neural mechanosensitivity may account for hamstring tightness and thereby predispose the muscle to subsequent strain injury. Neurodynamic sliding interventions are thought to decrease neural mechanosensitivity and it is shown that the inclusion of these interventions in the management of hamstring flexibility could be beneficial.[xix]Similar study was done by Shrinivas in 2016 comparing effect of Mulligan Bent Leg Raise versus Neural Mobilization on Hamstring Tightness in College Students which showed immediate effect of mulligan bent leg raise and neural mobilization on hamstring tightness in college going students. They concluded that Mulligan bent leg raise and neural mobilization techniques both showed immediate improvement in decreasing hamstring tightness which was reflected by increase in active knee extension and straight leg raise.

Muscle Energy Technique and Neural Tissue Mobilization techniques both showed immediate improvement in decreasing hamstring tightness which was reflected by increase in active knee extension and straight leg raise and finger toe test. The between groups comparison showed Muscle Energy Technique to be more effective than Neural Tissue Mobilization technique.Flexibility is important physiological component of physical fitness, and reduced flexibility can cause insufficiency at the workplace and is also a risk factor for low back pain. From the results of this study it can be helpful for individuals who desire to increase their flexibility in an attempt to decrease risk of injury, enhances performance, as well as for those clinician who incorporate Muscle Energy Technique and Neural Tissue Mobilization as part of their rehabilitation programme.

Conclusion

Muscle Energy Technique and Neural Tissue Mobilization techniques showed significant improvement in hamstring flexibility. Muscle Energy Technique is more effective than Neural Tissue Mobilization for improving hamstring flexibility in young adults.

Limitation and scope

The study could not evaluate reoccurrence of hamstring tightness after the intervention has stopped. Follow up study with home based exercise program could have shown long term effects of as well as adherence to the program. Similar studies can be conducted in different sports athletes to evaluate which technique proves effective.

REFERENCES

[i]Phrompaet, S., Paungmali, A., Pirunsan, U., &Sitilertpisan, P. (2011).Effects of Pilates Training on Lumbo-Pelvic Stability and Flexibility. Asian Journal of Sports Medicine, 2(1), 16–22.

iiAdkitte R, Rane SG, Yeole U, Nandi B, Gawali P. Effect of muscle energy technique on flexibility of hamstring muscle in Indian national football players. Saudi J Sports Med 2016;16:28-31.

iiiWeerasekara I, Kumari I, Weerarathna N, Withanage C, Wanniarachchi C. 2013. The prevalence of hamstring tightness among the male athletes of University of Peradeniya in 2010, Sri Lanka.Int J Phys Med Rehabil, 1:2.

ivHouston MN, Hodson VE, Adams KK, Hoch JM.2015. The effectiveness of whole‐body‐vibration training in improving hamstring flexibility in physically active adults. J Sport Rehabil.,24:77‐82.

vVidhi S, Anuprita T, Asmita K, Twinkle D, Unnati P, Sujata Y. 2014. Comparison of PNF technique with NDS technique for Hamstrings tightness in asymptomatic subjects. Indian J PhysiotherOccupTher., 8:158.

viKrohn K, Castro D, Kling J. 2011. The effects of kinesio tape on hamstring flexibility. Logan edu 1‐12.

viiKaur G, Reza MK. 2013. Efficacy of eccentric training and muscle energy technique on hamstring flexibility in sedentary college students. Indian J PhysiotherOccupTher 2013;7:93.

viiiLoutsch RA, Baker RT, May JM, Nasypany AM. 2015. Reactive neuromuscular training results in immediate and long term improvements in measures of hamstring flexibility: A case report. Int J Sports PhysTher.,10:371-7.

ixKage V, Ratnam R. 2014. Immediate effect of active release technique versus mulligan bent leg raise in subjects with hamstring tightness: A randomized clinical trial. Int J Physiother Res., 2:301‐4.

xGajdosik RL, Hatcher CK, Whitsell S.1992. Influence of short hamstring muscles on the pelvis and lumbar spine in standing and during the toe‐touch test. ClinBiomech (Bristol, Avon)7:38‐42.

xiLabovitz JM, Yu J, Kim C. 2011. The role of hamstring tightness in plantar fasciitis. Foot Ankle Spec., 4:141‐4.

xii Hopper D, Deacon S, Das S, Jain A, Riddell D, Hall T, et al. 2005. Dynamic soft tissue mobilisation increases hamstring flexibility in healthy male subjects. Br J Sports Med., 39:594‐8.

xiiiRadwan A, Bigney KA, Buonomo HN, Jarmak MW, Moats SM, Ross JK, et al. 2015. Evaluation of intra‐subject difference in hamstring flexibility in patients with low back pain: An exploratory study. J Back MusculoskeletRehabil.,28:61‐6.

xivNorkins C.C. Measurement of joint motion: A guide of goniometry, 2 ndedition page num 142-144

xvHamid MS, Ali M, Yusof A. 2013.Interrater and intrarater reliability of the active knee extension (AKE) test among healthy adults. J PhysTher Sci., 25:957–961. PubMed doi:10.1589/jpts.25.957

xvi Knott M, Voss D. Stretching exercises. [Online] Available from:URL:http://www.stretching-exercises-guide.com/pnf-stretching.html.

xviiWeppler CH, Magnusson SP. 2010. Increasing muscle extensibility: a matter of increasing length or modifying sensation? Physical Therapy. 90(3):438-449.

xviiiAparicio EQ, Quirante LB, Blanco CR, Send FA. 2009. Immediate effects of the suboccipital muscle inhibition technique in subjects with short hamstring syndrome: Journal of Manipulative and Physiological Therapeutics. 32(4):262-269.

xixYolanda Castellote-Caballero, MaríeValenza C, Emilio Puentedura J, Cesar Fernandez-de-las-Peñas, Francisco Alburquerque-Sendin. 2014. Immediate Effects of Neurodynamic Sliding versus Muscle Stretching on Hamstring Flexibility in Subjects with Short Hamstring Syndrome: Journal of Sports Medicine. 4:1-8.

****