Immediate Effect of Active Release Technique Versus Muscle Energy Technique in Subjective with Hamstring Tightness: A Rendomized Clinical Trial

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Abstract

Research Topic: To study and compare the effectiveness of active release technique and muscle energy technique in subjects with hamstring tightness.

Method: 60 normal healthy subjects (30 in each group) were recruited in the study under simple randomization method. Group A received single session of Active Release Technique and Group B received single session of Muscle Energy Technique for hamstring tightness. Active knee extension test (90-90 test) were measured pre-intervention and post-intervention. Data was analyzed using t-test.

Results: Statically there is significant ($p<0.05$) effect of active release technique than the muscle energy technique on subjects with hamstring tightness.

Conclusion: A single session of active release technique is better as compared to muscle energy technique to improve hamstring flexibility and range of motion. There for active release technique can be used with conventional techniques in clinical settings.

Keywords*: Hamstring tightness, Active release technique, Muscle energy technique, flexibility.*

Introduction

Muscular flexibility is an important aspect of normal human function. Limited flexibility has been shown to predispose a person to several musculoskeletal overuse injuries and significantly affect a person's level of function.[1] 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.[2]

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The hamstrings comprise three large muscles namely semi-tendinous, semi-membranous and biceps femoris which originate from the inferomedial impression on the upper part of the ischial tuberosity and gets inserted on the upper part of posterior surface of tibia. They are located in the posterior compartment of the thigh and acts on the hip and knee joint. Hence, they are extensors of hip and flexors of the knee.[3]

The tightness of hamstring muscle is one of the main factors hindering performance in daily activities. Reduction in the flexibility of the hamstring has been reported to increase the risk of damage to the musculoskeletal [4,5] of the Hamstring is important for general health and physical fitness.[6,7]Tightness of these muscles produces decrease range of motion and reduced flexibility of the pelvic, hip and knee joints.[8]

Maintain normal muscle length requires regular stretching to prevent muscle stiffness, decrease risk of musculoskeletal injuries and enhance physical performance. Maintaining the flexibility of hamstring muscle is important for general and athletic population and of utmost importance for health care professionals, to achieve this goal one needs to know the most effective and efficient technique to gain hamstring flexibility.[1]

According to Austin Sports Therapy, the active release technique, or ART, was developed by chiropractor DR. P. Michael Leahy to work on a variety of muscle, tendon, ligament, fascia and nerve issues. According to Austin Sports Therapy, ART treatments involve tension or massage and guided movements. Active release technique therapy for the hamstrings is designed to alleviate pain and tightness and help the hamstring to return to its normal condition.[9]

Muscle energy technique (MET) is an manual technique developed by osteopaths and is now used in many different manual therapy professions.[11]One such approach which targets the soft tissues primarily has been termed as MET and this is also known as active muscular relaxation technique.[10,11] It is claimed to be effective for a variety of purposes including lengthening a shortened muscles, as a lymphatic or venous pump to aid the drainage of fluid or blood and increasing the range of motion.[11,12]

GONIOMETER The instrument, which is used for measuring the range of motion (ROM) of the joint, it's called as goniometer. (In Greek: Gonio: angle, matron: measurement).

To measure a ROM of a Particular joint, the therapist should have a thorough knowledge on the ROM of an individual joint. Selection of goniometer is important factor while measuring the ROM of the joint. The universal goniometer is designed by Mr. Moore. This is the commonest variety having stationary arm, movable arm, and body. The body or axis of the goniometer is placed over the axis of the joint, which has to be measured. The stable arm does not have any motion and is placed over the proximal segment of the measuring joint. The movable arm is aligned with the distal segment of the measuring joint.[13]

Active Knee Extension Test

For AKE test participants were positioned supine on a plinth so that the leg not being tested was flat on the plinth with the knee extended. A strap was placed over the mid-thigh of this leg to eliminate any elevation of the limb. An additional strap was positioned -over the front of the participant's pelvis and around the plinth to maintain the pelvis in a neutral position during hamstring measurements. With the foot in neutral position and the knee flexed at 90^0, a standard universal goniometer was placed over the lateral femoral condyle, with 1 arm aligned along the thigh in direction to the greater trochanter and the other arm aligned over the leg in the direction of the lateral malleolus. From this position, subjects were instructed to extend the knee until they felt a strong resistance, holding this final position for 2 to 3 seconds to allow the goniometric reading. The result recorded corresponded to the amplitude, in degrees, of the knee-extension movement, starting from the initial test position (knee flexed at 90^0 which corresponded to the goniometric 0^0)[14]

Need of Study

There are many ways of reducing hamstring tightness but very few techniques give an immediate result. Active release technique and Muscle energy technique are convenient, quick, simple and easy to apply.

There has been a study to find out an immediate effect of Active release technique and Muscle energy technique. However, there was a paucity to compare both techniques and find out their comparative effect on hamstring tightness.

So, this study is an effort to find out the immediate effects of active release technique and muscle energy technique in subjects to improve the hamstring flexibility and also the joint range of motion.

Aim of Study

The aim of present work is to study and compare the effectiveness of Active Release Technique and Muscle Energy Technique in normal healthy subjects with hamstring tightness.

Objective of the Study

1. To find out the immediate effect of Active Release Technique on Hamstring Tightness.

2. To find out the immediate effect of Muscle Energy Technique on Hamstring Tightness.

3. To compare the immediate effect of Active Release Technique and Muscle Energy Technique on Hamstring Tightness.

HYPOTHESIS **Null hypothesis:** There is no significant difference between the immediate effect of Active Release Technique and Muscle Energy Technique on hamstring tightness subjects.

Alternative hypothesis: There is significant difference between the immediate effects of Active Release Technique and Muscle Energy Technique on hamstring tightness subjects.

MATERIAL

- Couch / Plinth
- Foam mattress
- Universal full circle metal goniometer
- Stop watch
- Consent form
- Assessment form
- Pen & paper -

Methodology

- **Study Setting:** Shri U.S.B. College of Physiotherapy, Abu Road

- **Source of data:** Abu road (Rajasthan), Nakhatrana & Lunawada (Gujarat.) - **Study population: Healthy subjects with hamstring tightness young adults.** - **Sample size: 60 Healthy subjects (M & F).**

- Sampling method: Random convenient sampling
- Study design: A Comparative study

Inclusion Criteria

- Age 18-35 years adults
- Gender: Both (male and female)
- Normal healthy subjects
- Minimum 20^0 restriction in SLR unilaterally

Exclusion Criteria

- Any history of lower extremity injury in past 3 months
- UMN and LMN
- Subjects involving in any sports and gymnasium activity
- Unwilling to participate and sign the informed consent

Measurment Procedure

Under convenience sampling, 60 Subjects were recruited randomly, who fulfilled the inclusion and exclusion criteria were taken for study purpose. Written informed consent was signed by the subjects with hamstring tightness before proceeding for the study procedure. Before staring the study a brief assessment was taken. Subjects were explained about the test and procedure to be conducted.

Total 60 healthy subjects with hamstring tightness were randomly allocated to two study groups. Group-A (n=30) received Active Release Technique and Group-B (n=30) received Muscle Energy Technique.

Assessment of tightness of hamstring was measured by using 90-90 test (active knee extension test) before and after the treatment.

Treatment protocol: GROUP-A (Active Release Technique): Subjects received single session of Active Release Technique (ART) on dominant side. There are 3 steps to perform ART. Step 1: Subjects lies supine on the plinth and gentle tension was applied to the hamstring muscle along the entire length while stretching the leg in different positions to better work the muscle. Step 2: Gentle tension was applied at the origin and insertion of the hamstring muscle.

Step 3: Gentle tension was applied around the adductors and gluteus muscle because hamstring connects to these muscles and that could be the source of hamstring tightness.[15]

GROUP-B (Muscle Energy Technique): Subjects received single session of Muscle Energy Technique (MET) on dominant side. The subject's knee was extended to the position where the subject first reported of any hamstring discomfort and moderate isometric contraction (approx. 75% of maximal) of the hamstring muscle was then elicited for a period of five second. After a period of three seconds of relaxation, the technique was repeated three times (for a total of four contractions).[11]

Results and Tables

Data was analyzed by SPSS version 20 for windows. Independent sample t-test was used to find out the effect of ART and MET techniques in 60(male:25 female:35) random convenient subjects with hamstring tightness. In this test t- value for Group A is -14.409 & for Group B is -23.923 and level of significance is 0.001 which is less than 0.05.

Table 1: Showing distribution of age & gender in Group-A & Group-B.

Variable	Group A	Group B
Sex	M-12 & F-18	M-13 & F-17
Average Age (yrs)	23.4±3.9	23.5±5.4

● Interpretation: Table 1 shows gender and age distribution.

Table 2: Descriptive statistics for AKE test

Measures/Group		Pre-intervention		Post-intervention		p value
		Mean	SD	Mean	SD	
AKE-test	Group-A	42.4	11.078	75.633	12.933	<0.05
	Group-B	51.833	8.094	81.2	10.838	<0.05

● Interpretation: The above table 2 shows the descriptive statics for AKE, which shows there was significant difference between the pre and post AKE (p<0.05).

Table 3: Inter-group difference.

Paired Samples Test									
Group		Paired Differences					t	df	p value
		Mean	SD	SD error	95%conf.int.diff				
					Lower	Upper			
Group A	ART	-33.2333	12.571	2.2952	-37.9277	-28.539	-14.4791	29	<0.05
Group B	MET	-29.3667	6.7235	1.2275	-31.8773	-26.8561	-23.9232	29	<0.05

● **Interpretation:** The above table-3 shows the inter group difference calculated by paired t-test which shows significant difference between group A and group B.

Discussion

The intent of the study was to compare the immediate effect of Active Release Technique and Muscle Energy Technique in subjective with Hamstring Tightness.

In present study, when the values of pre-treatment and post-treatment Active release technique and Muscle energy technique were analyzed, it was proved statically significant that Active release technique is more effective than the Muscle energy technique.

Hamstring tightness increases from early childhood and with advancing age other contributing factors like lack of physical activity, prolonged sitting also Play an important role in decreased hamstring flexibility and range of motion.

It was found that there was marked increase in the hamstring muscle flexibility after a single session of active release technique is more than the application of single session of muscle energy technique which stated significant outcomes.

1.Vijay kage and Rakhi ratnam, conducted a study on Immediate effect of active release tech. versus mulligan bent leg raise in subjects with hamstring tightness and concluded that a single session of ART is effective as compared to MBLR to improve hamstring flexibility and ROM.[18]

2. Dixit mohini,samal,subrat, conducted a study on immediate effect of muscle energy technique and active dynamic stretching on hamstring flexibility in healthy female adult of age and concluded that MET resulted in significant improvement as compared to dynamic stretching on hamstring tightness.[17]

3.Mohd.Waseem, shibili nuhmani,and C.S.Ram, conducted a study on efficacy of muscle energy technique on hamstring muscles flexibility in normal collegiate males and concluded that there is significant increase in popliteal angle followed by treatment of MET.[16]

4.**George, James& Tunstall,Andrew &Tepe, Rodger& Skaggs ,**conducted a study on effect of active release technique on hamstring muscle flexibility and concluded single ART treatment increased hamstring flexibility in healthy male patients.[15]

CLINICAL IMPLICATIONS

Results suggests that from both the techniques, single session of Active release technique is more effective than the single session of Muscle energy technique.

LIMITATIONS

● Subjects of 18-35 years of age were considered for study thus results cannot be generalized to all age group.

● Only immediate effect was studied Short and long-term effects were not studied that would have helped to find the maintenance of the improved outcome measures.

● Only AKE ROM was measured.

● Study was done only on normal subjects.

FURTHER RECOMMENDATIONS

● Further study on other techniques in combination with ART or MET needed to find the effect for individual with limited hamstring flexibility.

● Further studies are needed to find the effects of these techniques in conditions with secondary hamstring tightness.

● Further study can be done by using other outcome measures.

● Further study can be done with different sample size.

Conclusion

A significant difference is seen after the application of both the ART and MET techniques. A single session of active release technique is better as compared to muscle energy technique to improve hamstring flexibility and range of motion. There for active release technique can be used with conventional techniques in clinical settings.

Conflict of Interest: Nil.

Source of Fund: No fund was needed.

Ethical Clearance: From Shri USB College of

Physiotherapy, Aburoad, Rajasthan.

References

1. N agarwal A.K., Zutshi K,Ram c.s.,Zafar R. Improvement of hamstring flexibility: A comparison between two PNF stretching techniques. International journal of sports science and engineering 2010; vol. 4:25-33.
2. Glen M. De Pino,William G. Webright,Brent L. Arnold. Duration of maintained hamstring flexibility after cessation of an acute static stretching protocol. Journal of athletic training 2000;35(1);56-59.
3. Nishchal Ratna Shakya*, Sajan Manandhar, Prevalence Of Hamstring Muscle Tightness Among Undergraduate Physiotherapy Students Of Nepal Using Passive Knee Extension Angle Test, International Journal Of Scientic And Research Publications, Volume 8, Issue 1, January 2018 (182)

4.S. Jonhagen, G. Nemeth and E. Erikson, hamstring injuries in sprinters, the role of concentric and eccentric hamstring muscle strength and flexibility, American journal of sports medicine 22(1994),262-266.

5. HultmanG, SarasteH,Ohlsen H: Anthropometry. Spinal canal width,and flexibility of the spine and hamstring muscles in 45-55 year old men with and without low back pain.Jspinal ,Disord 1992,5: 245-253.Hartig D E, Henderson JM: Increasing hamstring flexibility decreases lower extremity overuse injuries in military basic trainees. Am j sports Med, 1999, 27:173-176.
6. HreljacA, Marshall R N, Hume PA: Evaluation of lower extremity overuse injury potential in runners. Med Sci sports Exerc, 2000.32:1635-1641. FasenJM,O' Connor AM, Schwartz SL,et al: A randomized controlled trial of hamstring stretching:comparison of four techniques J. strength cond res,2009,23:660-667.
7. Carolinkisner; Lynn Allen Colby, Therapeutic Exercise: Foundations and techniques, 5 th edition. Phileladelphia, F. A.Davis company.2007.
8. Stephens,J, Davidson, J., De Rosa, J, Kriz,M. and Saltzman, N: lengthening the Hamstring Muscles without stretching using " Awareness through Movement". Phys Ther; 86:1641-1650,2006.
9. Timothy onkst, The active release technique for the hamstrings. May 26;2011.
10 Chaitlow L, Liebenson C (Ed) In: Muscle Energy Techniques. 2001: 2nd Edition, Donald R Murphy, London. Pp 95-106.
11. Ballantyne F, Fryer G, Mclaughlin P. The effect of muscle energy technique on hamstring extensibility: the mechanism of altered flexibility. J Osteopathic Medicine. 2003: 6: 59-63.
12. Freyer G. et al. Muscle energy concepts: a need for change. J osteopathic medicine. 2000: 3: 54- 59
13. S. Lakshmi Narayanan, Textbook of Therapeutic Exercises, Jaypee Brothers Medical Publishers, 1st Edition-2005, (40)
14. Elise Shepherd, Sara Winter and Sue Gordon, Comparing Hamstring Muscle Length Measurements Of The Traditional Active Knee Extension Test And A Functional Hamstring Flexibility Test, Journal Of Physiotherapy & Physical Rehabilitation Shepherd Et Al., Physiotherapy Rehabilitation 2017, 2:1 Doi: 10.4172/2573- 0312.1000125
15. James w.george,Andrew c. tunstall,Rodger e. Tepe. The effects of active release technique on Hamstring flexibility: A pilot study Journal Of manipulative and physiological therapeutics 2006; volume 29:224-227.
16. Mohd. Waseem,shibili Nuhmani,C.S. Ram,Faheem Ahmad . A comparative study: static stretching versus eccentric training on Popliteal angle in normal healthy Indian collegiate males. International journal of sports science and engineering 2009; vol.3:180-186.
17. Dixit Mohini,subrat samal.a comparative study of the immediate effect of the muscle energy technique and active dynamic stretching on hamstring flexibility in healthy females adult of age. International journal of advance research,Ideas and innovations in technology 2018(volume4,issue2)
18. Vijay kage,Rakhi Ratnam,Immediate effect of active release technique versus mulligan bent leg raise in subjects with hamstring tightness:A randomized clinical trial.International journal of Physiotherapy and Research 2014,vol2(1):301-04