



IMMEDIATE EFFECT OF ACTIVE RELEASE TECHNIQUE (ART) VERSUS MUSCLE ENERGY TECHNIQUE (MET) ON HAMSTRING TIGHTNESS IN SEWING MACHINE OPERATORS.

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Abstract

Background: In sewing machine operators, due to prolonged sitting, the hamstring muscles are in shortened position (posterior pelvic tilt & knee 90 degree flexion) which causes the tightness of the hamstring muscles and also leads to further discomfort and hampers the performance to meet their job demands. Thus, the sewing machine operators were exposed to ART & MET which have an immediate effect on reducing the hamstring muscle tightness.

Methods: Ethical clearance was taken from different clothing factories and consent was taken from 60 subjects (sewing machine operators) having hamstring tightness. They were divided into two equal groups. Pre and post measurements of active knee extension test (AKE) and sit and reach test (SART) was taken. Group A underwent Active Release Technique and Group B underwent Muscle Energy Technique (MET).

Result: There was significant reduction in hamstring tightness ($p=0.0001$) in both techniques. Statistical comparison of both techniques showed that Active Release Technique (ART) was more effective than Muscle Energy Technique (MET).

Conclusion: This study concludes that Active Release Technique (ART) is more effective than Muscle Energy Technique (MET) in reducing hamstring tightness immediately.

Keywords: ART, MET, hamstring tightness, sewing machine operators.

I. INTRODUCTION

Flexibility is considered an essential element of normal biomechanical function.^[1] Limited flexibility has been shown to predispose a person to several musculoskeletal overuse injuries and significantly affect a person's level of function and causes neuro-musculoskeletal symptoms. These musculoskeletal symptoms will lead to decrease in strength, stability, endurance and much more.^[2] The hamstrings comprise three large muscles, namely semitendinosus, semi-membranosus and biceps femoris which originate from the infero-medial impression on the upper part of the Ischial tuberosity and gets inserted on the upper parts 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 the hip and flexors of the knee.^[1]

Overuse of muscles can also cause pain and injury to the area and can lead to pulls and tears or hypoxia of the involved muscles. This may cause the body to produce scar tissue that binds up the tissues that need to move about freely. This can cause the muscles to become shorter and put tension on the tendons and nerves can become entrapped.^[3]

Decreased hamstring flexibility is suggested to be one of the predisposing factors for hamstring strains hence hamstring stretches are routinely used as part of a pre-exercise routine, usually after an aerobic warm-up.^[4]

The Active release technique, was developed by Dr. P. Michael Leahy to work on a variety of muscle, tendon, ligament, fascia and nerve issues. ART treatments involve tension and guided movements. Active release technique therapy for the hamstrings is designed to decrease pain and tightness and help the hamstring to return to its normal condition.^[4]

Muscle energy technique (MET) is a manual technique and is now used in many different manual therapy professions. One such approach which targets the soft tissues primarily has been termed as MET and this is also known as Post isometric relaxation technique. It is claimed to be effective for a variety of purposes including lengthening a shortened muscle, as a lymphatic or venous pump to aid the drainage of fluid or blood and increasing the range of motion.^[5]

Most people who have desk jobs or jobs where they are sitting for extended periods of time eg: - in sewing machine operators, this causes the hamstrings to become weak and when the hamstrings are weak, there can be many adverse musculoskeletal consequences, which can cause pain and injury and subsequently reduce productivity at work.^[3] This study was specifically

aimed and targeted at reducing Hamstring tightness and improving work efficiency in sewing machine operators as the prevalence was found to be 83.4% ; 91.8% in males and 78.7% in females.^[6]

RESEARCH METHODOLOGY

The type of study was comparative study. The study setting was garment factory. Type of sampling was simple random sampling. The sample size was 60 subjects (Group A-30, Group B-30). Population was sewing machine operators. Duration of study was 6 months.

Materials and Methods

Materials and Methods which were used in our study were- Pen, Paper, Consent form, Goniometer, Sit and Reach box, Cross bar, Inch tape and cross bar straps. The outcome measures included Active Knee Extension (AKE) and Sit and Reach Test.

Sewing machine operators were included in the study. Thereafter, the sewing machine operators were randomly divided into two groups; group A (Active Release Technique) and group B (Muscle Energy Technique) with 30 subjects in each group. Both male and female were included. The age group included was 35-45 years. Subjects with six hours of continuous sitting (minimum) per day for minimum 6 months were included in the study.

Subjects with history of trauma to lower limbs in the past six months, history of surgery to hip and in the past six months and unwilling to participate and sign the consent form were excluded from the study.

Statistical tools.

Data was analyzed using paired t-test and unpaired t-test.

PROCEDURE

Subjects were admitted into the study according to the inclusion and exclusion criteria. Based on eligibility criteria participants were included. Written informed consent was signed by the subjects with hamstring tightness before proceeding for the study procedure. Before starting the study, assessment was taken. Pre treatment Hamstring flexibility was checked with AKE test and Sit and Reach test. Subjects were explained about the test and procedure to be conducted. After initial assessment the subjects were randomly allocated into 2 groups with each group consisting of 30 subjects.

Treatment protocol:

GROUP-A (Active Release Technique): Subjects received a single session of Active Release Technique (ART) on one of the lower limb exhibiting maximum amount of tightness. There are 3 steps to perform ART.

•Step 1: Subjects lie supine on the plinth and gentle tension is applied to the hamstring muscle along the entire length (longitudinal length) while stretching the leg in different positions to better work the muscle. Palpate the taut band. •Step 2: Gentle tension is applied along the origin and insertion of the hamstring muscle. •Step 3: Gentle tension is applied along muscle belly •This cycle is repeated for 5 more times (total 6 times). Post treatment Hamstring flexibility was checked with AKE test and Sit and Reach test.



Figure 1.1: Active Release Technique

GROUP-B (Muscle Energy Technique): Subjects received a single session of Muscle Energy Technique (MET) on one of the lower limb exhibiting maximum amount of tightness. The subject's knee was extended to the position where the subject first reported of any hamstring discomfort.

A moderate isometric contraction (approx. 20% of maximal) of the hamstring muscle was then elicited against the therapist's hand or on his shoulder for 7 – 10 seconds followed by 3 seconds of relaxation. Afterward the knee was extended with hip flexed and held for 30 seconds followed by short rest period (around 10 seconds) Repeated 2 more times. Pre treatment Hamstring flexibility was checked with AKE test and Sit and Reach test.



Figure 1.2: Muscle energy technique

Outcome Measures

1. Active Knee Extension (AKE)

Subject was positioned in supine lying position and the lower extremity to be tested on the cross bar in 90-degree hip flexion and 90-degree knee flexion. Velcro straps were used to secure the cross bar to the testing lower extremity and to maintain the subject's alternate leg at 0-degree hip flexion. The reading was noted down.



Figure 1.3 : Active Knee extension test.

2. Sit And Reach Test (SART)

The subject placed heels against the edge with legs flat on floor. Then subject placed one hand on top of other and attempted to reach slowly forwards. Subject's fingertips were in contact with the box all the time. The subjects were instructed to reach forwards as far as he/she could with both hands. They were asked to hold the position for 3 seconds and the measurements were recorded. To ensure reliability 3 readings were taken and the best of three was recorded.



Figure 1.4: Sit and reach test.

IV. RESULTS AND DISCUSSION

DATA ANALYSIS

Group A (Active Release Technique)

Active Knee Extension

Table no.1

STATISTICAL PARAMETERS	PRE-TREATMENT	POST-TREATMENT
Mean	27.83	43.4
SD	8.271	9.00
P value	<0.0001	
T value	11.53	
Interpretation	Statistically significant	

Group A (Active Release Technique)

Sit and reach test

Table no. 2

STATISTICAL PARAMETERS	Pre- Treatment	Post-Treatment
Mean	13.13	16.13
SD	3.20	3.82
P Value	<0.0001	
T Value	15.64	
Interpretation	Statistically significant	

Group B (Muscle Energy Technique)

Active knee extension

Table no. 3

STATISTICAL PARAMETERS	Pre- treatment	Post-treatment
Mean	25.66	29.43
SD	7.38	7.98
P Value	<0.0001	
T value	5.195	
Interpretation	Statistically significant	

Group B (Muscle Energy Technique)

Sit and reach test

Table no. 4

STATISTICAL PARAMETERS	Pre- treatment	Post- treatment
Mean	13.9	14.13
SD	2.73	2.35
P Value	0.0059	
T Value	2.971	
Interpretation	Statistically significant	

Active knee extension

Table no. 5

STATISTICAL PARAMETERS	GROUP A (ACTIVE RELEASE TECHNIQUE)	GROUP B (MUSCLE ENERGY TECHNIQUE)
Mean	43.4	29.43
SD	9.0	7.98
P Value	<0.0001	
T value	6.356	
Interpretation	Statistically significant	

Sit and reach test

Table no. 6

STATISTICAL PARAMETERS	GROUP A (ACTIVE RELEASE TECHNIQUE)	GROUP B (MUSCLE ENERGY TECHNIQUE)
Mean	16.13	14.13
SD	3.82	2.35
P Value	0.0250	
T value	2.302	
Interpretation	Statistically significant	

RESULT

60 subjects participated in this study, 30 in each group. Both males and females of age group 35-45 years were included in this study. Active Knee Extension and Sit and Reach Test were performed before and after the intervention. According to statistical analysis of the data, Active Release Technique is more effective than Muscle Energy Technique. Table no. 1 & Table no. 2 shows the comparison between pre treatment and post treatment values of Active knee Extension and Sit and Reach Test respectively for Group A. In this, the p value is 0.0001 which is statistically significant. . Table no.3 & . Table no.4 shows comparison between pre and post values of Active Knee Extension and Sit and Reach Test for Group B. In which p value is 0.0001 which is significant. . Table no.5 shows comparison between Group A and Group B for Active Knee Extension. The value for Group A is 43.4 ± 9.0 while for Group B is 29.43 ± 7.98 and p value is <0.0001 which is considered significant. . Table no.6 shows comparison between Group A and Group B for Sit and Reach Test. The value for Group A is 16.13 ± 3.82 while for Group B is 14.13 ± 2.35 and p value is 0.0250 which is considered significant. According to statistical analysis of the data, Group A (Active Release Technique) is more effective than Group B (Muscle Energy Technique).

DISCUSSION

Game Kankanamage Kanishka, Hansika Sandamali concluded that hamstring tightness is significantly associated with the increase of number of sitting hours.^[6] which is why our target study population was Sewing machine operators in whom maximum amount of prevalence was found. Mehreen Jabbar, Alishba Mustansar, Fariha Zulfiqar concluded that there is 55.5% prevalence of hamstring tightness due to prolonged sitting.^[22]

The intent of the study was to compare the immediate effect of Active Release Technique and Muscle Energy Technique on Hamstring tightness in Sewing machine operators.^[9]

The study was performed among 60 sewing machine operators between the age group 35-45 years of age. They were divided into two groups (Group A-Active Release Technique & Group B – Muscle Energy Technique). Hamstrings tightness was assessed before and after the treatment.^[5] The treatment was given as one single session. Active Release Technique and Muscle Energy Technique were both analyzed and it was proved statistically significant that Active Release Technique is more effective than the Muscle Energy Technique.^[9]

Hamstring tightness increases from early childhood and with advancing age and other contributing factors like lack of physical activity and prolonged sitting also play an important role in increasing hamstring tightness and decreased range of motion.^[5]

If hamstring muscle is not stretched regularly then there is a great chance of getting it tighter and shorter which leads to muscle “knots”.^[4] Active Release Technique and Muscle Energy Technique releases the scar tissue adhesions to allow full lengthening of muscle and regain flexibility for functional use.^[4]

It was found that there was marked decrease in Hamstring tightness after a single session of Active Release Technique.It shows Active Release Technique is more effective than the application of single session of Muscle Energy Technique which stated significant outcomes.^[9]

In this study significant improvement is seen in reducing Hamstring tightness by Active Release Technique as compared to that of Muscle Energy Technique. Data entered was analyzed by Graphpad Prism 9. There is statistical significance ($p=0.0001$) between pre and post values of Active Knee Extension and Sit and Reach Test of both the groups (Group A & Group B).

When Active Release Technique and Muscle Energy Technique was compared statistically (AKE-p value=0.0001, SART-p value=0.0250) it was found that Active Release Technique was statistically significant than Muscle Energy Technique.

This can be correlated with a study by Sarfraj Khan, Bhoomika Patel and Bansari Limbani which showed significant decrease in Hamstring tightness with Active Release Technique.^[9] James w Gorge, Andrew C Tunstall showed in their study that single ART treatment increased hamstring flexibility in a group of healthy, active male participants.^[13] This could be attribute to the manual deep tension used in ART as opposed to MET technique.

But one single study demonstrating the effectiveness of any manouvre is never sufficient as Joshi T M, Dr. Wani. S K stated that both types of Muscle Energy Techniques were equally effective on hamstring muscle bilaterally in young healthy females.^[10]

Also, Vibhuti Vinodsingh Gaur, Angela Arun Kapoor showed in their study that Active Release Technique and Muscle Energy Technique are both equally effective in reducing hamstring tightness.^[20]

Ballantyne, Fiona & Fryer stated the effect of Muscle Energy Technique on hamstring flexibility.^[11] Dr. Shambhavi Potdar, Dr. Sanket Nagrale stated that Active Release Technique and Muscle Energy Technique both are individually effective in reducing hamstring muscle tightness.^[5]

Active Release Technique restores the function by breaking the cross-fibre adhesions which restricts the smooth movement of tissues by adhering to adjacent tissues.

In Muscle Energy Technique, the Post Isometric Relaxation helps in lengthening of tight hamstrings by its contraction and relaxation method which proved as an effective technique in rehabilitation for elongating shortened muscle tissue.

The Post isometric relaxation in Muscle Energy Technique is a strong muscle contraction against equal counterforce which triggers the golgi tendon organ that causes relaxation of the antagonist muscle group thus causing lengthening of the agonists.^[5] On the other hand, Active Release Technique is performed by applying pressure by thumb pads on the adhesions or trigger points while simultaneously extending the knee by breaking the cross fibre adhesions.^[5] This helps to provide smooth movement of the tissues elongating the muscles. Hence, it is concluded through our study that Active Release Technique is more effective than Muscle Energy Technique to improve Hamstring flexibility and range of motion.

Also, both the groups individually show significant improvement in hamstring flexibility which concludes that both techniques are immediately effective.

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