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RESEARCH ARTICLE

EFFICACY OF DYNAMIC STRETCHING WITH MUSCLE ENERGY TECHNIQUE ON HAMSTRING FLEXIBILITY IN SEDENTARY INDIVIDUALS

***Arun, B., Mohan Gandhi, V. and Punitha Kumar, R.K.**

K.G. College of Physiotherapy, Dr. MGR Medical University, Chennai, Coimbatore. Tamil Nadu, India

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ABSTRACT

Introduction: Sedentary individual are more prone to have the muscle tightens, sedentary individual are the individual who does lot of activity in sitting postures. Hamstring muscle is a two joint muscle. Hamstring flexibility should be maintained well to gain full range of motion in both the joints. During ambulation activity of hamstring are more important. Stiffness in the hamstring could cause postural imbalance, pain, disability and reduced stability in the joint. Aim of the study is to identify the efficacy of Dynamic Stretching with Muscle energy technique on Hamstring flexibility in Sedentary Individuals. Quasi experimental study with 30 sedentary individuals was selected and their hamstring length was measured sit and reach testing. 30 volunteers were randomly allocated into two groups, experimental group with muscle energy technique and the control group with dynamic stretching. The programme was conducted for 8 weeks and the values of the hamstring flexibility were measured using sit and reach test. The pre value, 4th week and 8th week values were taken for the analysis. ANOVA was used to analyze the difference between the durations and the Tukey HSD test used to identify the amount of differences in each groups. **Results:** The result of the study shows that there was a significant improvement in the experimental group when compared with the control group with the significance of p value at 0.05. The Anova value is 56.7 in the Muscle energy technique group and the value is 168.54 in the dynamic stretching group. The critical value of U at $p < .05$ is 64. Therefore, the result is significant at $p < .05$. This study concluded that MET stretching would produce more hamstring flexibility when compared to the dynamic stretching in hamstring tightness.

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INTRODUCTION

Physical fitness attributes includes various components and one of the component is flexibility. It is often evaluated through measuring the joint range and it is very important component in everyday life (Hopper *et al*., 2005). Flexibility defined as the ability of the muscle to lengthen and allows one joint or more than one joint to move through a range of motion (Smith, 2008). Reduction in flexibility is one of the major risk factor for the muscle injury (Odunaiya *et al*., 2005). Hamstring muscle is a multi-joint muscle, where tightness is always common. Hamstrings tightness affects both active as well as sedentary individuals (Karthikeyan Rajendran *et al*., 2016). Lack of flexibility in the hamstring muscle is the important predisposing factors to hamstring strain (Jonhagen, 1994). Physiologically the musculotendinous unit in the hamstring muscles got reduced on the capacity to lengthen with reduction of the numbers in the sarcomeres with which there is a reduction in the length or elasticity of the connective tissue. Since work environments have become increasingly automated and computerized, many workers may be living more sedentary life style and spending a greater proportion of their living in sitting. The prolonged sitting causes the hamstring to go for the shortened position which predisposes to hamstring tightness[4]. Sedentary lifestyle could lead to various problems which includes muscle tightness, reduction in length of the muscles, reduced range of motion and decrease flexibility which hampers daily activities of the Individuals (Collins, 2004). Stretching has been promoted for many years as an integral part of training programme as well as the management of tightened muscles. Various stretching techniques include cyclic stretching, static stretching, PNF stretching and dynamic stretching are being used in the management of muscle tightness. Muscle energy technique (MET) is a manual technique developed by osteopaths that is now used in many different manual therapy professions. Multiple researchers has done on the effect of muscle energy technique on improving hamstring flexibility (Gribble, 1999; Magnusson *et al*., 1996).

***Corresponding author:* Arun, B.,**
K.G. College of Physiotherapy, Dr. MGR Medical University, Chennai, Coimbatore. Tamil Nadu, India
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Studies attributed the effectiveness of MET to the inhibitory golgi tendon reflex. This reflex is believed to be activated during isometric contraction of muscles, which is claimed to produce a stretch on the golgi tendon organs and a reflex relaxation of the muscle (Kuchera, 1992). Various studies have attempted to establish the effects of various stretching combined with some modalities, but most of them have sought to elucidate the effects of modalities associated with static stretching. And few have evaluated their association with dynamic stretching and muscle energy techniques yet, they were not very well compared. Accordingly, the aim of this study was to evaluate the effects on dynamic stretching with muscle energy technique on hamstring flexibility in sedentary individuals.

MATERIALS AND METHODS

Study is a quasi experimental study which had 30 volunteers. Volunteers were recruited from the IT campus through notice, pamphlet distribution, and internal web circulations. One hundred subjects showed willingness to recruit in the study, they were all assessed for the medical complaints and the volunteers were assessed with the length of hamstring muscles using sit and reach test. Those who have tightness more than 10 cms were recruited for the study as well as suitable for the inclusion criteria. 30 volunteers were randomly allocated into two groups using computers. 15 participants were included in control group, they all have undergone dynamic stretching and 15 participants were included in experimental group, they all underwent muscle energy technique. The volunteers are with the age group of 25-40 years, without any history of lower limb injury, office workers with more than 5 years of experience, not involved in any kind of active sports or exercises, and with no signs of hamstring injury. A brief introduction about the study and the exercises were described to the volunteers.

They all were advised to follow the instructions given by the researcher. The exercise program was given for 8 weeks on alternate days in a week. Muscle energy technique was applied to the every individual by the trained therapist who has more than 5 years of experience in the manual therapy. The METs was applied based on the technique (Ballantyne *et al*., 2003) described in Ballantyne *et al*., 2003. Dynamic stretching was applied to the every individual participants supervised by the therapists. Active stretching exercises were advised for 15 mins. Treatment session lasts for 45 mins which has 15 mins for warming up. Totally they all underwent 24 sessions of treatment. Sit and reach was used for measuring the hamstring length in the volunteers, the measurement was taken on the first visit (pre test), in the middle of the session (4^{th} week) and at the end of the programme (8^{th} week- post test). All the values collected were analyzed using statistical tests. ANOVA was used to analyze the difference between the durations and the Tukey HSD test used to identify the amount of differences in each groups.

Data analysis: Statistical analysis were done to identify the effect of the groups, the characteristics of the groups were explained in the table I. The values were identified at three intervals which are used for the analysis using ANOVA and the results were shown that there were significant differences exist on the groups and the three values. Once the ANOVA was identifies the differences then the post hoc test was applied to identify the amount of differences in the groups.

It has shown that the critical value of U at $p < .05$ is 64. Therefore, the result is significant at $p < .05$.

Characteristics	Mean	S.D	Value	Significance
Male	31.5	4.86		
Female	31.6	4.87		
Age	31.53	4.81		
Weight	79.033	13.8		
Height	163.7	10.8		
Years of Working	10.833	3.46		
Sit & Reach test Group A	15.2	1.464	F=56.70	$p < 0.05$
Sit & Reach test Group B	17.8	1.216	F=168.54	$p < 0.05$
Post Hoc test	-	-	U= 64	$p<0.05$

DISCUSSION

The purpose of the study is to evaluate the effect of muscle energy technique on hamstring flexibility in sedentary individuals. Hamstring is one of the important muscles for the locomotion of human as well as it is the common muscle which gets injured frequently (Orchard, 2012). Hamstring strains occur as a result of tightness in the muscle group (Heiderscheit *et al*., 2005). Researchers have hypothesized that when the muscle does maximal eccentric contraction in the running cycleor the muscle lengthens and shortens frequently possesses higher risk of muscle injury (William, 2001). Mechanism like poor muscular efficiency, overload to the muscles, excessive training and poor technical efficiency results in hamstring tightness. Changes in joint arthrokinematics, imbalances in the muscle and reduction in the control of muscle cause alteration in the whole kinetic chain results in abnormal compensation and adaptation. Various authors have demonstrated that an increase in neural drive in the tight or hyperactive muscle and reduction in neural drive in the inhibited hypoactive muscles (Hartig, 1999). Dynamic stretching group produce improvement, because during the stretching there is an increase in the length of the musculotendinous unit, as well as the other structures around the joint like fascia, joint capsule (Page, 2012). Dynamic stretching is an alternative for the static stretching as many evidences suggest that it has positive influence on the physical performance. It also prepares the central nervous system for the necessary coordination and activation of motor units (McMillian *et al*., 2016).

Dynamic stretching cause eccentric phase of activity in which the elastic component lengthens and stores elastic energy which is reused in the concentric phase of the stretch shortening cycle where the series elastic components springs back to its original form. There are consistent evidences shows that dynamic stretching improves muscle performances, agility, speed and strength (Potach, 2000). The setbacks in the dynamic stretching could be due to repeated contraction in dynamic stretching results in disruption and membrane damage that could cause of less improvement of muscle flexibility in dynamic stretching (Gregory *et al*., 2002). On the other hand the Muscle energy technique (METs) is found to be the best technique on increasing the length of the muscle as well as the range of motion of the joint, it also produces a combination of changes in the connective tissue (creep and plastic change) which would increase flexibility. This happens due to either biomechanical or neuro-physiological changes or may be due to an increase in tolerance to stretching (Chaitow, 2006). This technique helps to relax the overactive muscle as well as the associated connective tissue which produce elongation of the

muscle (Freyer, 2003). The study has few limitations includes small group of population were selected and the follow up of the participants were difficult. Our present result, showing that hamstring muscle activity is increased in MET stretching when it was compared with the dynamic stretching. So this study concluded that MET stretching would produce more hamstring flexibility when compared to the dynamic stretching in hamstring tightness.

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Conflict of Interest: Nil

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