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# Effects of autogenic inhibition mets and reciprocal inhibition METS on hamstring flexibility in subjects with bilateral hamstring tightness

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**Abstract**
The study is to compare the effects of autogenic inhibition METS and reciprocal inhibition METS on hamstring flexibility in subjects with bilateral hamstring tightness.
**Introduction:** MET is a form of manual therapy, widely used in osteopathy, that uses a muscle's own energy in the form of gentle isometric contractions to relax the muscles via autogenic or reciprocal inhibition and lengthen the muscle. As compared to static stretching which is a passive technique in which the therapist does all the work, MET is an active technique in which the patient is also an active participant. MET is based on the concepts of autogenic inhibition and reciprocal inhibition.
**Methodology:** Total of 30 subjects, aged between 18-25 years male subject with bilateral hamstring tightness were selected based on the inclusion and exclusion criteria. The study was approved from Institutional review board. A total 30 subjects were selected and divided into two groups by convenient sampling method. Back Saver Sit and Reach (BSSR) test was used as an outcome measuring tool. Group A consist of 15 subjects with Autogenic inhibition MET and Group B consist of 15 subjects who were treated with Reciprocal inhibition MET. The study duration was 4 weeks.
**Outcome measure:** Back Saver Sit and Reach test.
**Results:** On comparing Pre test and Post test within and between Group A & Group B on Back Saver Sit and Reach test scores show significant difference in the mean value at P≤0.05.

**Keywords:** Hamstring tightness, autogenic inhibition, reciprocal inhibition, back saver's sit and reach, muscle energy technique

## Introduction
The hamstring muscle is commonly affected muscle group due to excessive stress. The hamstring, which resists knee extension, is constituted of semitendinosus, semimembranosus, and biceps femories muscle [1, 2]. These result in varying degrees of rupture within the fibres of the musculotendinous unit. Hamstring strain are common in sports with a dynamic character like sprinting, jumping and contact sports [3]. Hamstring muscle injuries are one of the most common musculotendinous injuries in the lower extremity [4]. METS are a commonly utilized method for achieving tonus release in a muscle before stretching. The approach involves the introduction of isometric contraction to the affected muscle producing post isometric relaxation through the influence of the Golgi tendon organ [5, 6]. Muscle Energy Techniques (METs) is a manual techniques developed by osteopaths and is now used in many different manual therapy profession [7]. Muscle energy techniques (MET), focus on muscle and connective tissues. Even though literature supports the use of joint mobilization [8]. Conventional Static Stretching (SS) is a technique commonly applied in the management of neck pain and other mechanical disorders, but it focuses only on the passive component of muscle tone, which is generated by connective tissue structures such as endomysium, epimysium and perimysium [9] whereas MET focuses not only on the passive component of muscle tone, but also on the active component generated by the sarcomeres themselves [10]. MET which can maintain muscle elongation for this duration, may produce increase in muscle length by combination of creep and plastic change in the connective tissue [11]. A tight hamstring is one of the most common complaints involving muscle tightness. When hamstring muscles are tight, then it is more prone for tears. Due to long period activities of knee flexion

developing a risk of hamstring tightness, lead to affect posture, gait and the way that the body moves during exercise [12]. Muscle Energy Technique is a direct technique originally developed by Fred Mitchel, Sr., DO. The purpose of this technique is to treat joint hypomobility (stiffness) and restore proper biomechanical and physiological function of the joint(s). Muscle Energy Technique (MET) is a type of manual therapy "involving the voluntary contraction of the patient muscle in a precisely controlled direction, at varying levels of intensity, against a distinctly executed counter-force applied by the operator" [13] which is reduced by the use of either autogenic or reciprocal inhibition (RI) techniques. However, it is not known which of the two inhibition techniques is more effective. Moreover, conventional stretching is not indicated in acute or maximum protection phase of management [14]. The effects on range of motion (ROM) are in conclusive. Moreover, currently no study exists focusing on the immediate effects of autogenic inhibition (AI) and Reciprocal inhibition (RI) METS [15]. It 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. Due to inactive and irregular exercise, hamstring tightness is common and frequently occurs in people with non- specific low back pain (LBP). Reduced extensibility resulting from increased hamstring stiffness could be a possible contributing factor to low back injuries. Clinical observations have suggested that hamstring tightness influences the lumbar pelvic rhythm and may be associated with modifications in the sagittal spine curvatures during trunk flexion (TF). Posterior thigh muscles are called hamstring group muscles. They are semitendinosus, semimembranosus, and biceps femoris long and short head. All together flex the knee but the short head of biceps femoris alone extends the hip. Hamstring muscles originate from the ischial tuberosity of the pelvis and posterior femur and inserts on the proximal lateral tibia. It is one of the two joint muscles. Hamstring muscles act as strong flexors of the knee and weak extensors of the hip. The hamstring is a variable length. Some person cannot touch their fingers while standing as their hamstring muscles are rather short or tight. The sciatic nerve supplies the hamstring group of muscles. The length of the hamstring cannot be directly measured, this measurement is done in the angular measurement of unilateral hip flexion with the knee extended. The active knee extension test is the best method to rule out the extensibility range of the hamstring muscle with the hip stabilized at 90 degrees and with accurate instrument placement. This method gives reliable measurements about hamstring extensibility and length with a 90/90 position in supine and amount of extension was measured using both an electro goniometer and a standard goniometer. From this finding, it can be stated whether mechanical low back pain is caused by hamstring tightness. Hamstring musculature has one of the highest incidences of injuries in sports that require rapid accelerations and changes of direction. Mostly composed of type II fibers, this biarticular muscle is responsible for knee flexion and hip extension, and this double action makes it more vulnerable to strain. The hamstring muscles are commonly linked with movement dysfunction at the lumbar spine, pelvis and lower limbs, and have been coupled with low back pain and gait abnormality. Decreased hamstring flexibility is a risk factor for the development of patella tendinopathy and patellofemoral pain hamstring injury and symptoms of muscle damage following eccentric exercise. There is higher percentage of prevalence of hamstring tightness in right lower extremity. Hamstring tightness increases with age and affects between 40-49 and mostly males are affected hamstring measurement using straight leg raise test is less accurate because of the rotation of pelvis that occurs during the test.

**Methodology**

The study was designed as experimental way with comparison of pre and post test values. The study was done at Chennai with thirty convenient samples. The duration of the study was 4 weeks with 3 session per week. The inclusion criteria were bilateral hamstring tightness with male age group between 18 – 25 years subject's only. The subjects who were not under any specific stretching program in past 6 months and active knee extension greater than 20 degree also included. The excluded part of the study was acute inflammation, hyper mobility of lower limb joints, recent fracture in the lower limb and recent injuries in the spine and lower extremity. Outcome measure: Back Saver Sit and Reach Test (BSSR).

**Procedure**

This study was a comparative pre-test and post-test type. A total of 30 subjects were selected based on the inclusion and exclusion criteria.30 subjects were selected and divided into two groups by convenient sampling method. BSSR were used as an outcome measuring tool. Group A consist of 15 subjects who were treated with autogenic inhibition MET and Group B consist of 15 subjects who were treated with Reciprocal inhibition MET for 4 weeks(3 Session per week).Pre-test and post test were measured. Pre-test were taken before initiation of the intervention program and post test were taken at the end of the intervention session.

**Results**

On comparing the mean values of Group A & Group B on Back Saver Sit and Reach Test Score, it shows a significant increase in the post test mean values in both groups, but (Group A - Autogenic Inhibition) shows 29.66 ± 2.35 which has the higher mean value is more effective than (Group B - Reciprocal Inhibition) 25.00 ± .200 at $P \leq 0.05$. Hence the null hypothesis is rejected. On comparing mean values of Back Saver Sit and Reach Test Score between Pretest 18.80 ± 1.89 & Posttest 29.66 ± 2.35 in Group A - Autogenic Inhibition and Pretest 18.93 ± 1.79 and Posttest 25.00 ± .200 in Group B - Reciprocal Inhibition shows there is a highly significant difference between Pre test and Post test mean values in both groups at $P \leq 0.05$.

**Discussion**

Hamstring strain are common in sports with a dynamic character like sprinting, jumping and contact sports. Hamstring muscle injuries are one of the most common musculotendinous injuries in the lower extremity. A tight hamstring is one of the most common complaints involving muscle tightness. When hamstring muscles are tight, then it is more prone for tears. Due to long period activities of knee flexion developing a risk of hamstring tightness, lead to affect posture, gait and the way that the body moves during exercise. It is a form of manual therapy, widely used in Osteopathy, which uses a muscle's own energy in the form of gentle isometric contractions to relax the muscles via autogenic or reciprocal inhibition and lengthen the muscle. As compared to static stretching which is a passive technique in which the therapist does all the work, MET is an active technique in which the patient is also an active participant. MET is based on the concepts of Autogenic Inhibition and Reciprocal

Inhibition. The Active knee extension test is the best method to rule out the extensibility range of the hamstring muscle with the hip stabilized at 90 degrees and with accurate instrument placement. This method gives reliable measurements about hamstring extensibility and length with a 90/90 position in supine. In this study 30 subjects were selected and age group btw 18 to 25 who were treated with hamstring tightness with inclusion and exclusion criteria in this study. All this subjects in this group showed improvement in hamstring muscle tightness and all are reported that there was improvement in their hamstring muscle flexibility. On comparing Pre test and Post test value of group A who were treated with autogenic inhibition technique applied hamstring muscle and shown significant improvement in the hamstring muscle tightness. Date analysis expose that the treatment value score all the parameters were assessed using statistical package for social science (SPSS) version 24, with a significance level of p value less than 0.05 and a 95% confidence interval set for all analysis. The Shapiro wilk test was used to determine the normality of the data. In this study, shapiro wilk test showed that the data was normally distributed on the dependent values such as Back Saver Sit and Reach Test Score (significance 0.596) at $P > 0.05$. Hence parametric test was adopted. Paired t-test was adopted to find the statistical difference within the groups & Independent t-test (Student t-Test) was adopted to find statistical difference between the groups. Muhammad Osama Syed Shakil Ur Rehman [2020]: AI-MET was found to superior to SS and RI-MET both in terms of immediate and short-term effects in the management of mechanical neck pain. The difference between SS and RI-MET was not conclusive. In this study, the following results as follows: On comparing the Mean Values of Group A & Group B on Back Saver Sit and Reach Test Score, it shows a significant increase in the post test mean values in both groups, but (Group A - Autogenic Inhibition) shows 29.66 ± 2.35 which has the higher mean value is more effective than (Group B - Reciprocal Inhibition) 25.00 ± .200 at $P \leq 0.05$. Hence the null hypothesis is rejected. On comparing mean values of Back Saver Sit and Reach Test Score between Pretest 18.80 ± 1.89 & Posttest 29.66 ± 2.35 in Group A - Autogenic Inhibition and Pretest 18.93 ± 1.79 and Posttest 25.00 ± .200 in Group B - Reciprocal Inhibition shows there is a highly significant difference between Pre test and Post test mean values in both groups at $P \leq 0.05$.

## Conclusion

The study concluded that four weeks of autogenic inhibition technique and reciprocal inhibition technique in subject with bilateral hamstring tightness have shown autogenic inhibition MET have significantly decreased hamstring tightness when compared to reciprocal inhibition MET

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## Conflict of Interest

Nil

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