Improvement of Iliopsoas Flexibility: A Comparative Effectiveness between Post Isometric Relaxation and Static Stretching

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Abstract

Background and Purpose: Illiopsoas muscle not commonly gets stretched in the activities of daily living. So tightness may be developed. Most common component of the physical conditioning programme is flexibility used as an adjunct to the muscle strength and endurance training. The purpose of this study was to compare the effectiveness of MET (PIR) technique and Static stretching technique directed at the illiopsoas muscle on hip extension.

Objective: To find out pre and post interventional effect of MET (PIR) and Static stretching techniques and compare the effectiveness of both techniques for increasing flexibility of illiopsoas muscle.

Method: A Quasi Experimental study was conducted. Total 50 participants were included in our study on the basis of the inclusion criteria. Then participants divided in to two groups: Group A received MET (PIR) and Group B received Static Stretching. Iliopsoas tightness is assessed by modified Thomas test and degree of hip extension measured by the universal goniometer.

Result: The study show that the both the techniques MET (PIR) and Static Stretching significantly effective for the illiopsoas tightness. Comparison of both techniques shown MET (PIR) group was significantly effectiveness for iliopsoas tightness than Static Stretching group.

Conclusion: MET (PIR) technique was most effective for improving flexibility for iliopsoas than Static Stretching Technique.

Keywords: *iliopsoas tightness, modify Thomas test, muscle energy technique (post isometric relaxation), and static stretching.*

Introduction

Muscle is just too short to permit the full passive range of motion or active range of motion. Gastrocnemius-soleus, Tibialis posterior, Iliopsoas, Rectus Femoris, Hamstrings and Hip adductors muscles more prone for tightness in lower extremity[1]. Sternocleidomastoid (SCM), Upper trapezius, Pectoralis major, and Levator Scapulae are more prone for tightness. Tightness of lower Iliopsoas leads to discomfort, pain and ache in the front of the hip socket. In the upper iliopsoas, the symptom that is most prevalent is the sense of holding or tension in solar plexes.

Flexibility is an important component of physical conditioning programme used as an adjunct to muscle strength and endurance training. Flexibility of the Iliopsoas muscle is necessary because flexibility allow the tissue to accommodate more easily to stress to abandoned shock impact and to improving the efficiency and effectiveness of the movement. Flexibility is defined as the ability to move a joint through a normal range of motion (ROM) without excessive stress to the musculotendinous unit[2]. Iliopsoas muscle very uncommonly to get stretched in the activities of daily living that lead to tightness of Iliopsoas. Iliopsoas muscle is the strongest hip joint flexors. It plays a significant role in the movement and stabilization of the pelvis[3]. Tightness of Iliopsoas has been significantly correlated with the back pain. Short Iliopsoas group pulls the spine in to hyperelordosis and an anterior tilted pelvis which

put stress on all the spinal muscles including the erector spinae. Shortness of Iliopsoas muscle can pull and twist the vertebrae causing excessive compression of the disc, which lead to herniation of disc. Iliopsoas dysfunction leads to symptoms like pain and discomfort in lower back and SI joint region[4].

To reduce tightness of Iliopsoas, different techniques such as Proprioceptive neuromuscular facilitation technique[5], Soft tissue mobilization, Stretching technique (static, balastic)[6], Yoga (asanas such as Navasana, Virabhadrasana, Sarvangasana[7], Myofascial release[8] and Muscle energy technique[9]. Static stretching is the most commonly used form of stretching to improve the flexibility of muscle and safe. MET technique can be used to lengthening and strengthen of muscles to improve fluid mechanics and to decrease local oedema and to mobilization of a restricted articulation[9]. Post isometric relaxation is a part of a MET. It is used for relax tight muscles without initiating stretch reflex[10].

The purpose of this study was to compare the effectiveness of two techniques, static stretching and post isometric relaxation for Iliopsoas tightness. Primary objective of this study was to find out pre and post interventional effect of MET (post isometric relaxation) and static stretching for increase Iliopsoas flexibility. Secondary objective of this study was to compare the effectiveness of MET (PIR) and Static Stretching for increase Iliopsoas flexibility.

Methodology

This is Quasi Experimental trial age group 18-30 year. Inclusion criteria were both male and female willing to participate, right or left lower limb, 10 or more than 10 degree of Iiopsoas tightness. Exclusion criteria were subjects with history of trauma of lumber spine and pelvic, inflammatory condition that affect motion, chronic back pain, any cardiac problem, presence of tumours that can restrict hip range of motion, spinal deformity, and any recent injury and surgery. All the participants was signed the written inform consent. The purpose of the study was explained to all the subjects who volunteered to take part in the study. The subjected were selected according to inclusion an exclusion criteria. Total 90 subjects were assessed and 50 subjects included in study. The participants divided according to block randomization into two groups. Participants divided into two groups: Group A (MET- PIR) and Group B (Static Stretching). Pre treatment measurement were taken by using Universal Goniometer for hip extension ROM. Hip extension range of motion was measured on the 1st day of treatment procedure and on the 6th day of treatment procedure for all the participants.

Group A – Post Isometric Relaxation:

Patient's position supine lying at the edge of the table, non tested leg in flexion at both hip and knee and experimental thigh and leg hang on the edge of table. Extend the knee of the opposite thigh up to the barrier. After that told the patient to flex the hip against minimal resistance (isometric) and to breath in for 7 seconds. Told the patient "relax" and exhale slowly. Wait for 5 seconds as long as relaxation takes place. Three times repeat this procedure. Perform this method for 6 days in a week and once in a day[10].

Group B – Static Stretching

Patient position: Patient position close to the edge of the treatment table so the hip being stretched can be extended beyond the neutral position. The opposite hip and knee are flexed towards the patient's chest to stabilize the pelvis during the stretching.

Hand placement and procedure: Stabilize the opposite leg against the patient's chest with one hand, or if possible patient assist by grasping around the thigh and holding it to prevent tilt of the pelvis during the stretching.

Move the hip to be stretched into extension or hyperextension by placing downward pressure on the anterior aspect of distal thigh with your other hand. Allow the knee into extension so the two joint Rectus Femoris does not restrict the range. The stretched was maintained by 30 seconds and performs one time. Perform this method for 6 days in a week and once in a day[9].

Modified Thomas Test: Patient held in supine position with buttocks as close to the end of the table as possible, the non-tested leg in flexion at both hip and knee hold by patient themselves. Full flexion of hip helps to maintain the pelvis in full rotation with the lumbar spine flat. If the tested thigh lies in horizontal positioning which it is parallel to the floor that indicates

Iliopsoas is not short. If the thigh rises above the horizontal positioning that indicates Iliopsoas is short[11]

Goniometer Alignment: Fulcrum held at lateral aspect of the hip joint, refence point taken as a greater trochanter of the femur. Proximal arm held at lateral midline of the pelvis. Distal arm held at the lateral midline of the femur using the lateral condyle of tibia as a reference point[12].

Modified Thomas test Goniometer Alignment

Statistical analysis:

The data was analysed by using SPSS Version 2.4. The data was normally distributed check by the SPSS version 24. Comparison of post mean difference score between group A and group B was done by Wilcoxon Signed rank test. Comparison of pre and post scores within group A and group B was done by Mann Witney U test.

Result

Table 1: Shows demographic characteristics of study participants

Variables	Group A (MET)	Group B (Static Stretching)
Age (mean ± SD)	20.32 ± 1.51	18.48 ± 0.50
Right (N %)	92%	92%
Left (N %)	8%	8%
Female	8	17
Male	7	18

Table 2: Shows post and pre hip extension ROM mean intervention data for MET group and static stretching group

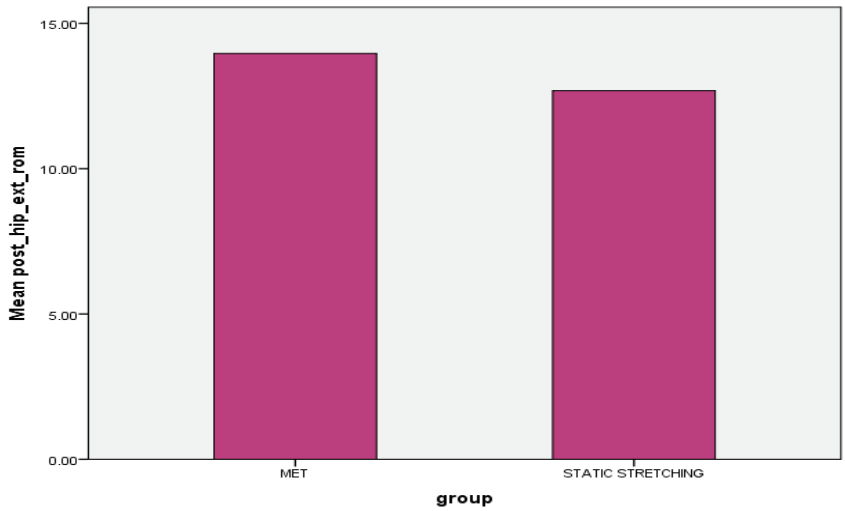
	Pre-post hip extension ROM mean	p value
Group A	13	0.000
Group B	13	0.000

Table 2 shows that the comparison for pre and post hip extension range of motion of MET group and Static Stretching group were done by using Wilcoxon signed rank test. In group A and group B the data was statistically significant ($p<0.005$). Data showed that pre- post hip extension ROM improving in both the intervention groups for Iliopsoas tightness.

Table 3: Shows comparison of post hip extension ROM mean between the groups

	Post hip extension ROM mean	p value
Group A	33.46	0.000
Group B	17.54	

Table 3 shows that comparison for post hip extension ROM of both groups by using Mann Whitney U Test. The data was statistically significant (p=0.000). It was found that Group A (MET- PIR) highly significant for improving the Iliopsoas flexibility.



Graph 1: Shown that comparison of post intervention value of MET and Static Stretching

Discussion

The review of literature regarding the role of different techniques in Iliopsoas tightness reveals confusing pictures. So that our study was design to obtain a more understand about which method more effective MET (PIR) or static stretching in Iliopsoas tightness. Our study suggested that both the techniques effective for improving Iliopsoas flexibility, but MET (PIR) technique were highly significant in increasing the flexibility of Iliopsoas than static stretching.

Many experimental study conducted for lengthening of shortened muscles but little research available for clinician to help in choose which method or technique is more beneficial. This study suggested that long term effect of pre and post comparison of hip extension range of motion was significantly increase with MET (PIR) and static stretching group. The data of this study was statistically significant within the group after treatment suggested that both the techniques were effective in improving hip extension ROM and Iliopsoas flexibility.

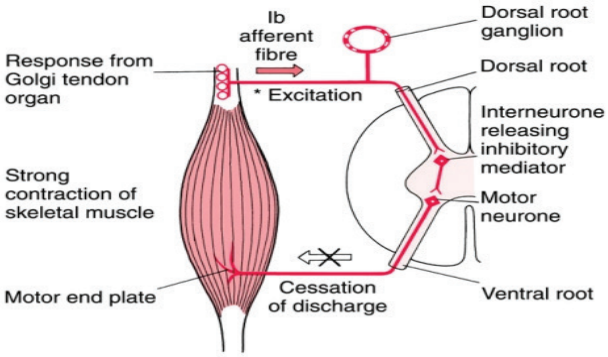
In this study MET (PIR) technique was highly significant in improving the Iliopsoas flexibility. This finding supported by Sonal et al. suggested that PIR and Reciprocal inhibition technique showed significant improvement on hamstring tightness. But PIR is more significant effective than the reciprocal inhibition technique in individual with the hamstring muscle tightness[13].

Our study finding also supported by Rashad Ahmed et al. suggested that the MET and dynamic stretching

showed significant improvement in hamstring tightness. But MET was significantly more effective than dynamic stretching in healthy individuals with hamstring tightness[14].

An improve flexibility after MET due to biomechanical or neurophysiological changes or due to increase tolerance to stretching. In neurological mechanism that may produce improved range of motion of a joint after MET, however little research available for these theories. Kuchera suggested that effectiveness of MET to the inhibitory golgi tendon reflex. This reflex is believed to be activated during isometric contraction of muscles, which is produced stretch on the golgi tendon organ and a reflex relaxation of the muscle[15].

In PIR technique, strong muscle contraction against a counterforce triggers the Golgi Tendon Organ (GTO) and enters the dorsal root of spinal cord and meet with an inhibitory motor neuron. This stops the discharge of the efferent motor neurons impulse and thus prevent for further contraction, muscle tone reduced, which lead in agonist muscle relaxation and lengthening[16].



The basic concept of PIR is to contraction of tense muscle isometric and then muscle encourage to lengthen during a period of complete voluntary relaxation. Gravity is used to encourage release of muscle tension and taken up to the slack[17]. Davis et al. suggested that static stretching technique was only effective for increasing length of hamstring[18].

Limited evidence suggested that if muscle held in a lengthened position for an extended period of time, it adapts by increasing the number of sarcomere in series, referred as a myofibrillogenesis. It is theorized that number of sarcomere addition occurs to maintain the greatest functional overlap of actin and myosin filaments in muscle and it leads to permanent from of lengthening if the newly gained length is used on a regular basis in functional activity[19].

Met is more effective compared to static stretching because MET increases ROM faster rate due to active and precise recruitment of muscle fibers activity.

Conclusion

The study concluded that the both the MET (PIR) technique and Static Stretching are effective for improve flexibility of Iliopsoas. But the MET (PIR) is better and effective technique as compared to static stretching.

Limitation and further recommendation:

Limitation of our study: Intervention duration was short period of time, not taken long term follow up and small sample size. In future scope study conducted with large sample size, long term follow up, long treatment duration, also included subject with low back pain.

Conflict of Interest: None

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Ethical Clearance: Taken from institutional advisory board

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