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Research Article

Comparison between Muscle Energy Technique and Pnf Stretching with Conventional Physiotherapy on Hamstring Flexibility in Chronic Nonspecific Low Back Pain

Dr. Sumit Asthana, Dr. Arif Rizvi[2]

[1]Associate Professor & Head, Assistant Dean, E.I.A.H.Sc. & R, Era University, Lucknow

[2]Assistant Professor, E.I.A.H.Sc. & R, Era University, Lucknow

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Corresponding author: Dr. Sumit Asthana

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Abstract:

Objective: The effect of muscle energy technique and PNF stretching in comparison of conventional physiotherapy on hamstring flexibility.

Background: Hamstring tightness or decrease flexibility is a predisposing cause for hamstring strain, lumber spine disorders and low back pain. This study aimed to evaluate the effects of Muscle energy technique (MET) and PNF stretching in improving pain intensity (PI) hamstring flexibility (HF) in chronic nonspecific low back pain (CNSLBP).

Study design: Randomized Clinical Trial

Methods: SUBJECTS; 30 subject's male and female in age group of 20-40 years with hamstring tightness in chronic nonspecific low back pain were recruited for study. The pre-post outcome measures included range of motion (ROM) of active knee extension test as measured using Goniometer, and Pain intensity measurement using Numerical pain rating scale (NPRS). The treatments were given for five consecutive days a week for total of four weeks.

Results: Results showed that there is significant improvement by MET and PNF stretching in comparison of conventional group static stretching used in hamstring flexibility in significantly decrease pain in low back and increase active knee extension range of motion in hamstring flexibility in three groups.

Conclusion: The result of this study indicates that muscle energy technique , PNF stretching and static stretching produce a significant improvement in hamstring flexibility. Therefore it is concluded the MET, PNF and static stretching can be use as an effective therapeutic maneuver for decrease pain, improving ROM and increase flexibility of tight hamstring in chronic low back patient.

Key words: Chronic nonspecific low back pain, Muscle energy technique, PNF stretching and Static stretching, Hamstring flexibility, Active knee extension ROM, RCT– Randomized clinical trial.

INTRODUCTION

Non-specific low back pain(LBP)is defined as LBP which is not attributed to recognizable, known specific pathology, e.g. Infection, tumor, osteoporosis, ankylosing spondylitis, fracture, inflammatory process, Radicular syndrome or caudal equine syndrome (Burton et al 2004).[1] Acute LBP refers to pain present for upto 6 weeks. Disorders of the low back are the leading cause of disability in people younger than 45 years of age.[2] 80% of LBP has been mentioned nonspecific.[3] It has been estimated that mechanical disorders of the spine, represent at least 98% of LBP.[4]low back pain occurs in people with a wide variety of professions, including those involving heavy labor, repetitive work activities, and extended sedentary postures.[5]Ischemia, Trigger Points, Nerve Compression and Nerve Entrapment, Structural Imbalance, Postural Distortion & Dysfunctional Biomechanics are the 5 primary problems that causes non-specific low back pain.[6]

Approximately 90% of adults will suffer from an episode of LBP at some time in their lives, 50% will have a recurrent episode and 5–10% will develop chronic and potentially disabling LBP (Andersson GBJ). Mechanical LBP is one of the common causes of LBP; however, there is no clear consensus on the best treatment for this condition. Conservative treatment may include manipulation, myofascial release, exercise, modalities, and a number of other treatment options. Conservative treatment often includes flexibility exercises, especially of the hamstrings.[7]

In patients with NSLBP, it is difficult to assess with a clinically performed manual test whether the limited ROM can be attributed to increased muscle stiffness or decreased extensibility of the hip or the back muscles. It is also not known whether these muscles are active or passive during manual testing. Patients with NSLBP show similar ROM and fingertoe- ground distance as subjects with short hamstrings. In subjects with short hamstrings, stretching exercises result in increased ROM and no changes in muscle stiffness.- Stretching exercises are also applied in patients with NSLBP.[8]

Many clinicians support this practice based on the theory that normal hamstring length will prevent excessive lumbar flexion during postures that place the hamstrings in a lengthened position such as forward bending.[9] McGill has shown that increased lumbar flexion during forward bending tasks increases anterior shearing forces on the spine and increases risk of injury. Thus, if decreased hamstring flexibility leads to increased lumbar flexion during forward bending tasks it may increase the risk of injury to the spine from mechanical stresses.[10]

Various authors have suggested different way of applying MET, by altering the force, duration of contraction, direction of isometrics contraction and length of post contraction and length of post contraction stretch.[11] Several study have investigated various flexibility treatment on joint range motion. These study have established that PNF stretching and MET are both effective in improving joint flexibility in comparison to control group however ,there is still some conjecture about which is most effective method to be used by practitioner.[12]

Reduced hamstring muscle flexibility has been implicated in lumbar spine dysfunction, with a number of studies showing a strong positive correlation between decreased hamstring flexibility and low back pain.[13]

Methods

Participants:

The sample consisted of 30 volunteers, male and female, with no history of musculoskeletal disease. Their ages ranged from 20 to 40 years. Each volunteer was randomly assigned to one of three independent groups: a Muscle energy technique (PIR), PNF stretching (Contract Relax) and control group Static stretching in hamstring flexibility in chronic nonspecific low back pain.

Variables:

The Independent variables were muscle energy technique and PNF stretching and conventional physiotherapy for hamstring flexibility in chronic nonspecific low back pain and the dependent variables were pain and ROM.

Outcome measures:

Primary outcome measures were pain (measured using numeric pain rating scale) and hamstring flexibility measured by universal goniometer.

Study Protocol

30 subjects of chronic nonspecific low back pain were selected according to inclusion criteria and allocated into group A, group B and group C. All the patients in both the groups were pre-tested for pain and hamstring flexibility. After pre-testing subjects in group A were given muscle energy technique and group B were given PNF stretching. Post-test measurements were done after 4 weeks. The treatments were given for five consecutive days a week for total of four weeks.

Results:

Group A is muscle energy technique, Group B is PNF stretching and Group C is conventional physiotherapy in static stretching. The analysis revealed that there was statistically significant difference between pre and post scores of NPRS and goniometer in all groups. Group B is showing more improvement than group A and C at p value < 0.05.

PAIN: The mean and standard deviation value of pre NPRS of Group A was 5.1±0.875, Group B was 5.1.±0.875, and Group C was 5.1±0.875 respectively. No significant difference was found among 3 groups in terms of Pre NPRS. The mean and standard deviation value of post NPRS of Group A was 2.1±0.737, Group B was 1.3±0.483, and Group C was 2.5±0.527 respectively. Here, significant difference was found among 3 groups in terms of post NPRS after 4 weeks of intervention.

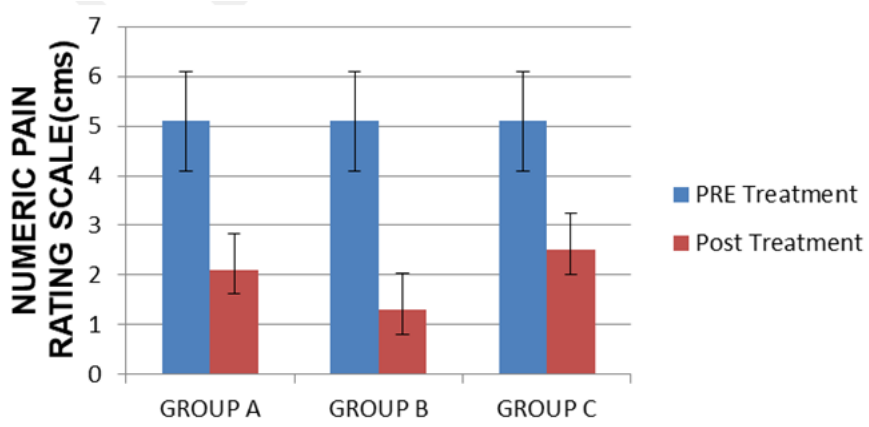

Figure 1: Mean, standard deviation of Pre-Post NPRS within Group A, B and C.

The above graph shows pretest and post test scores of NPRS within group-A, B & group C. Though there is significant improvement of Pain in three groups. in the between group comparison, there was significant improvement of group A,B & group C. but significant improvement was more in group B as compare to group A and group C.

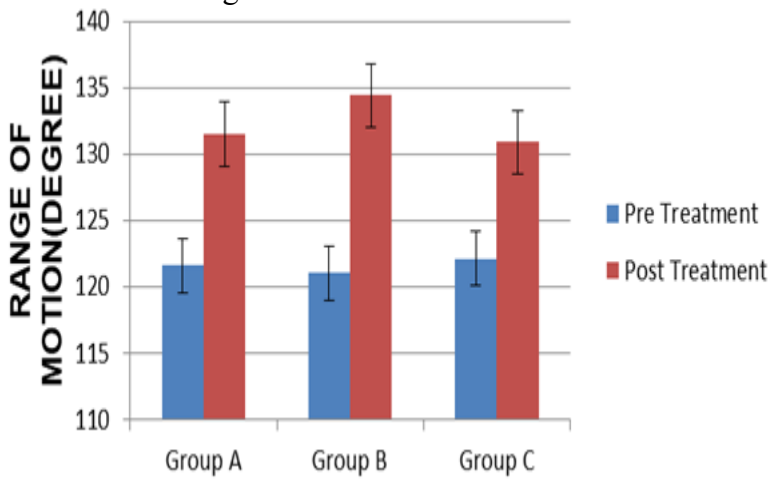

Figure 2: Mean, standard deviation of Pre-Post ROM within Group A, B and C.

The above graph shows pretest and post test scores of Knee extension range of motion within group-A, B & group C. Though there is significant improvement of Active knee extension ROM in three groups. in the between group comparison, there was significant improvement of group A,B & group C. but significant improvement was more in group B as compare to group A and group C.

Discussion:

In the present study the three groups had equal number of subjects and show no significant difference with respect to their age and gender distribution, which could have altered the result of the study. There is statistically significant improvement in three groups but the group B has shown more significant improvement in reducing pain and improving flexibility as compared to the group A and group C and the result of group A is more significant than group C. Therefore after the data analysis the result of present study did not support the null hypothesis and thus alternate hypothesis was accepted.

The present study suggest that the gains achieved by MET and PNF stretching might be explained by autogenic inhibition defined by Ruch and Pattonis inhibition mediated by afferent fibers from a stretched muscle and acting motor neurons supplying the stretched muscle. Houkand Henneman found that golgi tendon organs(GTOs) are very sensitive to active contraction of muscle. During the isometric contraction with muscles in their lengthened range, a great amount of tension is produced which may stimulate the GTOs in the hamstring muscle, causing the muscle to reflexly relax.

Muscle tightness is one of the limiting factors for restricted range of motion and reduce flexibility of joint. Hamstring muscles are more prone for tightness cause for musculoskeletal problems. This study was designed to compare the effect of muscle energy technique and PNF stretching on hamstring flexibility in chronic nonspecific low back pain patient .

Nourbakhsh and Arab decrease hamstring flexibility is a common finding in low back patient, if hamstring flexibility is reduces with low back pain. Improving hamstring flexibility in low back pain patient may allow increase motion of the pelvis around the hip during forward bending, reducing the stresses on the posterior structures of the legs and spine and decrease pain.[14]

Li et al,[14] found a four weeks program of daily hamstring stretching lead to an increase hamstring flexibility. This present study that used to Muscle Energy Technique , PNF and Static stretching to see the effect of hamstring flexibility in chronic low back pain pateint and this study will significantly improvement in flexibility in all group. But PNF stretching technique are more effective than the MET and Static stretching.

MET and PNF stretching methods have been clearly shown to bring about greater improvement in joint ROM and muscle extensibility than passive, static stretching, Both in short and long term conducted by study by Sady et al, Wallin et[15,16,17,18]. The present study also suggest that the muscle energy technique emphasized on the relaxation of the contractile component of the muscle while static stretching focused on the non-contractile viscoelastic component. Thus, our study demonstrated that the MET are the more effective than the static stretching to improving the flexibility of the muscle.

A comparison of the pre-test and post -test values of the ROM by active knee extension test and NPRS for the group shown that there was a significant improvement of all the group after 4 week. Another important observation is that there was a significant improvement in pain and ROM of group B(PNF stretching) as compare to the group A (MET) and group C(static stretching).

The finding of our study suggested that there was significant difference between muscle energy technique and static stretching which concurs with other study that have similar result. Gribble et al[19] compare the effect of static and hold relax stretching on hamstring muscle, drawing the influence that both were equally effective in improving hamstring range of motion in low back pain patient.

In the present study the basis for PNF stretching is theorized to be through neural inhibition of the muscle group being stretched. The proposed neural inhibition reduces reflex activity, which then promotes greater relaxation and decreased resistance to stretch, and hence greater range of movement (Hutton). However, Magnusson et al. noted that paradoxically, some studies have shown PNF techniques to be associated with greater electromyography activity in the muscle being stretched when compared to a static stretch. Still, other research has found PNF techniques to promote greater relaxation.[20]

This finding is indicating that it is possible to significantly increase range of motion in people with CLBP by use of a 4-week intensive PNF exercise program. The positive effects of the present training programs could be attributed to the nature of PNF exercises, which are designed primarily to maximize improvements in flexibility. Such exercises take advantage of the body's inhibitory reflexes to improve muscle relaxation. This muscle relaxation allows a greater stretch magnitude during stretch training, which should result in superior gains in flexibility. These results provided further support of previous findings on the positive effects of PNF techniques on hamstring flexibility[7], Also supported my study the effects of sustained stretch and proprioceptive neuromuscular facilitation (PNF) stretch techniques on hamstring muscle activation and knee extension range of motion (ROM) in different athletic populations[11].

Based on the results of this study, the muscle energy technique, PNF stretching and static stretching are effective methods in increase hamstring flexibility and decrease pain in chronic nonspecific low back patient. PNF stretching are more effective than the MET and static stretching in increasing hamstring flexibility.

Limitations

A large sample size required to make the study more reliable. Our study is limited to two outcome measures other outcome measures can also be used. Only pain and knee extension range of motion was measured and analyzed. Another limiting factor is that no functional scale is used in this study.

Conclusion

The result of this study indicates that muscle energy technique, PNF stretching and static stretching produce a significant improvement in pain and hamstring flexibility. After a 4 week, the group are performing the MET, PNF and static stretching in increase hamstring flexibility significantly. Therefore it is concluded the MET, PNF and static stretching can be used as an effective therapeutic maneuver for decrease pain, improving ROM and increase flexibility of tight hamstring in chronic low back patient.

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