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Immediate Effectofmuscle Energy Technique (MET) For Hamstring Tightness In Mechanical Low Back Pain In College Students-A Case Series

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Abstract

Background and objective: The hamstrings tightness is one of the most prevalent complaint in college-going students (male and female) which contribute to the impairment of spinal mobility and lead to low back pain. LBP results inlimitations in a patient'sfunction leading to anxiety and impairment in one's social and professional activities.Therefore, the aim of this study was to evaluate the immediate effect of muscle energy technique(MET) for hamstring tightness in college students with LBA.

Method: In a case series study design, a total of five college students with LBA were recruited. The subjects were treated with MET using a post-isometric relaxation technique for 3 repetitions with 10sec. hold for 5days. The hamstring flexibility was evaluated by using sit and reach test and the pain using the NPRS scale and functional outcome using RMQ.The

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outcome measure evaluated as baseline and end of 5thday. Paired 't' test was employed to assess the effectiveness.

Study design:A case series

Results:
All the study subjects were females age between 20-25yrs.The study result showed, there was a statistically significant improvement in pain ($p<0.05$), hamstring flexibility ($p<0.008$) and functional improvement ($p<0.05$)
Conclusion: This study concluded that MET is effective in increasing thehamstring flexibility in colligate students and showed significant improvement in relieving mechanical low back pain.

Introduction

Low back pain is a universal medical issue and leads to the most incessant ailment in people. It is one of the commonest and inconvenient causes of injury. LBP is the leading reason for inability in youth grown-ups and under 45 years old [1]. Low Back Pain can be due to muscle strain, or firmness confined beneath the coastal edge of ribs or more the sub-par gluteal folds with or without sciatica, and characterized as interminable when it continues for 12 weeks. Vague low back pain is tormenting not ascribed to an unmistakable pathology [2]. In India, about 60% of individuals have huge back pain issues. Every year, between 15 to 45 % of grown-ups experience the ill effects of low back pain, and 5% of them present to the emergency clinic with another scene. About 10% stayed incapable to do work and about 20% had steady manifestations at one year due to back pain [3]. The pervasiveness of LBP is all around the world about 80% of American grown-up population will have LBP every year [4]. Flexibility is an integral part of the ideal musculoskeletal system which is characterizedby the capacity of a muscle to stretch and permits one joint (or more than one joint in an arrangement) to travel through a scope of movement [5][6].An absence of flexibility is related to issues in executing and sustaining motor activities in everyday life[7]. Hamstring tightness is one of the most widely recognized findings in patients with LBP. Hamstrings are a group of muscles that is prone to get shorten. Three musclesSemitendinosis, Semimembranous, biceps Femoris muscles that are referred as to hamstring muscles spread from the back ofthe thighto knee. The inability to accomplish knee extension movement greater than 160º with hip at 90º of flexion is considered as hamstring tightness. Limitations of knee augmentation because of tightness and shortness of hamstring muscles is increasingly

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normal in the female population[8].A study in Denmark uncovered that 75% of the young men and 35% of the young ladies beyond ten years old found to have short hamstrings. The investigationalso concluded that when there is a tightness of hamstrings, the rate of back pain hikes to 15%[5]. The vast majority of individuals with tight hamstring were asymptomatic and symptoms start to appear as LBP with issues as the decreased hamstring extensibility whichalters the lumbopelvic rhythm. The motivation behind our present study is to check the effectiveness of MET in both low back pain and hamstring flexibility in prior investigations.Effectiveness MET forhamstring flexibility with the utilization of popliteal edge angle uses(Active Knee Extension test) in the previous studies; however, they have excluded the related issues that started with the course of hamstring tightness. To check the improvement, this studyincorporates Roland-Morris low back scale and questionnaire for low back pain and sit and reach test for flexibilityexamination.

METHODOLOGY

Study design: A case series study.A sample size of five college students wasincluded in the study.

Study type: Pre and post-experimental

Study setting: The study was conducted in physiotherapy OPD, Lovely school of physiotherapy and paramedical science. Punjab

Participant's description: A total of five participants with the complaint of LBA was selected from physiotherapy OPD based on the fulfilment of inclusion and exclusion criteria.

INCLUSION CRITERIA

1.Both males and females.

2 Subjects with hamstring tightness with mechanical low back pain.

3.Adult age between 20-25yrs.

EXCLUSION CRITERIA

1.Radiating pain, parenthesis or numbness.

2.Had physiotherapy treatment for the past 3 weeks or 1 month beforethe intervention.

3.Motor weakness.

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4.Diminished reflex.

5.Chronic low back pain for more than 12 weeks.

6.Spondylolisthesis.

7.Previously back surgery.

Instrumentation:

Sit and reach box test: It is used to check the flexibility of hamstring.The subject is asked to sit in front of the sit and reach box and is asked to lean forward along the alignment of sit and reach scale and the therapist will stand beside the subject to take measurements. This first reading served as a warm-up and so limber up the body and to decrease the chance of any kind of injury. Then take 2nd and 3rd attempts and choose the best one out of two as per MET measurement [9].

Study procedure: Study protocol was approved by the ethical committee of LPU, Phagwara following participants were given the informed consent. A single-blinded study, the study protocol period was of 1 week. Participants were asked to attend the LPU OPD for 5 days a week resulting of total 5 treatment sessions. The physiotherapist will perform all the assessment and baseline measurements on the first day (pre-test score), for pain, flexibility, and functional status by taking NPRS, sit-reach test and Roland-Morris questionnaire scale. In pre-reading, we first measure the pain by using NPRS. It is a pain scale having values from 0 to 10. Ask the patient to rate their pain levels,where 0 means no pain and 10 means max[10]. RMQ score will be accessed followed by NPRS to measures the functional levels of patients. RMQ scale consists of 24 questions. Ask the patient to fill the questionnaire and conclude the findings of functional levels in terms of percentage[1]. Afterward, we need to checkthe flexibility of hamstring. The subject was asked to sit in front of the sit and reach box and was asked t to lean forward along the alignment of sit and reach scale and the therapist will stand beside the subject to take measurements.This first reading served as a warm-up and so limber up the body and to decrease the chance of any kind of injury. Then take 2nd and 3rd attempts and choosethe best one out of two as per sit-reach test [9].Post measurementwas performed similarly to assess pain by using NPRS, functional levels by using the RMQ scale and hamstring flexibility by sing sit-reach test.

All 5 subjects received MET for back pain and hamstring tightness. MET was performed 3 times with a post-isometric hold of 10 secs on bilateral legs for 5 days in 1week. Subjects

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were given rest of 5 seconds in between the treatment and then after treatment check for the hamstring flexibility gradient by sit and reach test [11].

OUTCOME MEASURE

1. NPRS[10]
2.Sit and reach test[9]
3.Roland Morris disability scale[1]

Data analysis: The collected data wereanalyzedusing SPSS version 17.0. It was used to test for normality of scores and distribution of all variables. To compare the result of pre and post-intervention, the paired 't' test was used. Results were reported as means and standard deviations. The significance was accepted at the alpha level of < 0.05.

Result:

5 female participants falling age between 20-25 yrs. were selected for the study. All the included subjects were completed their study. (Table 1). The mean(SD) age of participants was 22yrs (1.51) with weight and height of 55kgs (2.54) and 162.4cms (2.91) respectively.

Table1.Demographic characteristics of subjects.

	Mean ± SD
Age (Years)	22.6000± 1.51658
Weight (Kgs)	55.0000±2.54951
Height (Cms)	162.4080± 2.91169

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Table 2.Pre and Post-intervention data

	PRE_SNR	POST_SNR	PRE_NPRS	POST_NPRS	PRE_RMQ	POST_RMQ
SUBJECT1	-4	3	7	3	12	5
SUBJECT2	2	11	6	2	12	3
SUBJECT3	2	5	5	2	13	6
SUBJECT4	1.5	6.5	6	3	12	4
SUBJECT5	-10	1	6	3	13	5
MEAN	-1.7	5.3	6	2.6	12.4	4.6
SD	5.286776	3.801316	0.707107	0.547723	0.547723	1.140175

Table3.Comparison of pre and post data for Sit-reach test, NPRS, and RMQ

Paired Samples Test

		Paired Differences				t	df	Sig. (2-tailed)
		(Mean±SD)	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pair 1	PRE_SNR - POST_SNR	-7.00000±3.16228	1.41421	-10.92649	-3.07351	-4.950	4	0.008
Pair 2	PRE_NPRS - POST_NPRS	3.40000±0.54772	0.24495	2.71991	4.08009	13.880	4	0.000
Pair 3	PRE_RMQ - POST_RMQ	7.80000±0.83666	0.37417	6.76115	8.83885	20.846	4	0.000

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Table: 3 Improvement in Roland Morris Questionnaires for the patient with LBA

Subject 1	Subject 2	Subject 3	Subject 4	Subject 5
Pre =12 Post=5 • 12-5=7 • 7/12X100 =58.33%	Pre=12 Post=3 • 12-3=9 • 9/12X100 =75%	Pre =13 Post=6 • 13-6=7 • 7/13X100 =53.85%	Pre=12 Post =4 • 12-4=8 • 8/12X100 =66.6%	Pre=13 Post =5 • 13-5=8 • 8/13X100 =61.5%
58.33% improved	75% improved	53.85% improved	66.6% improved	61.5% improved

Discussion

According to the review of existing literature regarding the role of different techniques in improving low back pain and flexibility reveals a confusing picture. So the purpose of this current study is to figure out the immediate effect of MET in both LBP and hamstring tightness. Hamstring tightness and decreased flexibility will be the most frequent causes of mechanical low back pain in the age group between 20 to 30 years. In earlier studies, active knee extension test and MET were used to improve the flexibility of hamstrings but they excluded the hamstring tightness course as a factor for originating back pain [5]. As low back pain is responsible for considerable personal suffering due to pain and reduced function as well as a societal burden. This current study focus on the use of MET for both LBA and hamstring flexibility. In previous studies, there was a limitation of using MET techniques for the pain they had not taken any measure to assess improvement and disability following treatment due topain. This study included the RMQ scale to assess the improvement after treatment. The result ofthe subjects in the study shows a tremendous improvement in the NPRS scale $p < 0.05$. The reason for pain relief may be due to biomechanical or neurophysiological changes that occur due to an increase inthe flexibilityof hamstring. Pre to post readings of the sit-reach test alsorevealsa significant difference in improving the flexibility of hamstring as well as there was a consequent improvement of disability on the

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RMQ scale as p<0. 008 to p<0.05.Inanother study, uses strain and counterstain MET techniques for the treatment of low back pain shows was a significant difference in the pain improvements in a patient with LBA [11]. But the current study utilizes the Post-isometric relaxation, 3 repetitions of isometrics contraction with 20% force and a hold of 10 seconds which significantly improve the hamstring flexibility andLBP [5]. In other words, it is proven that the submaximal isometrics contractions (MET) are effective in improving muscle flexibility. Isometric contraction if we use more than 70% it will reduce blood flow and oxygen supply that prevent muscle relation and higher the risk of muscle cramps [6]. If we compare the pre-post readings of RMQ disability scale subjects were shown a greater percentage of improvement as follows 58.33%, 75%, 53.85%, 66.6%, and 61.5%

CONCLUSION

This study concluded that the Muscle Energy Technique(MET) positively improves low back pain and increases hamstring flexibility. Besides, associated problems like joint stiffness were also released. After treatment given to all the subjects, we noticed a significant improvement in their back functions and following were able to be more active plus reported to have pain free movements which were earlier restricted by pain, tightness of musculatures and stiffness of joints. We were also enlightened by the spontaneous effect of MET improving hamstring flexibility and back pain. Moreover, these results suggested that there could be a direct correlation between hamstring muscle length and low back pain. Bringing up questioning of weather hamstring tightness induces low back pain or oppositely could hamstring tightness be a result of a complication of low back pain. Therefore, we're opening the topic to further researches, which could be supportive of our hypothesis or not, thus helping us to improve our physiotherapeutic approach to patients with low back pain and or hamstring tightness.

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