



Comparison of Janda's Muscle Energy Technique Vs Myofascial Release of Hamstrings on Back Range of Motion and Dysfunction in Adolescent girls with Nonspecific Low Back Pain

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Abstract

Background: Nonspecific Low Back Pain among the adolescent girls is due to underlying predisposing factors like postural errors, lack of physical exercise in which Hamstrings tightness is a key contributing factor.

Methodology: The research was experimental in nature. The subjects was selected through purposive sampling. 60 female collegiate girls was selected and divided into 3 groups. Group A include 20 subjects was given conventional treatment as Hot Pack on Hamstrings Muscle over the posterior aspect of thigh of both the lower limbs for 10 minutes. Then Lumbar Mobility Exercises was performed by subject.

Group B include 20 subjects was given conventional treatment as Hot Pack on Hamstrings Muscle over the posterior aspect of thigh of both the lower limbs for 10 minutes. Then Lumbar Mobility Exercises was performed by subject.

Group C include 20 subjects was given conventional treatment as Hot Pack on Hamstrings Muscle over the posterior aspect of thigh of both the lower limbs for 10 minutes. Then Lumbar Mobility Exercises was performed by subject. Pretest and Post test data for both the groups will be evaluated for Back Pain using Visual Analogue Scale and Back Dysfunction using Oswestry Low Back Pain Disability Questionnaire respectively.

Result: The data was analysed by using paired and unpaired t-test. There were Significant differences in pre and post scores of Group B (MET) and Group C (MFR) when paired t-test was applied. When these groups were compared using unpaired t-test, all showed significant differences. Group B (MET) demonstrated more improvement than Group C (MFR) and Group A (control). However, Group C (MFR) showed significant improvement than Group A (control).

Conclusion: The study concluded that Muscle Energy Technique is better than Myofascial Release Technique in improving Back Range of Motion and Dysfunction among Adolescent Girls with Nonspecific Low Back Pain. There was a significant variation of values between the Muscle Energy Technique and Myofascial Release

Keywords: janda's muscle energy technique; myofascial release; hamstrings; adolescent girls; nonspecific low back pain

Introduction

Nonspecific low back pain is defined as low back pain which is not attributable to a recognizable, known specific pathology (e.g. infection, tumour, osteoporosis, fracture, structural deformity, inflammatory disorder, radicular syndrome, or cauda equina syndrome). It is the most common musculoskeletal disorders¹. when the patho-anatomical cause of the pain cannot be determined².

Prevalence of annual low back pain (LBP) in children and adolescents has been increasing over the years, and the values vary between 13.7 and 60.3 % according to several national and international studies³. A previous history of Nonspecific low back pain is often predictive of future back problems⁴.

Chronic cases represent a significant burden on the health care and compensation systems⁵. The frequency of back pain back has been increase with age, particularly around the period of puberty⁶. Several factors, such as genetics, physiology, psychosocial characteristics, age, gender, physical activity level, use of computers, carrying backpacks and school furnishings, puberty, sitting posture, obesity and socioeconomic status, have been associated with LBP in adolescents. In the industrialized world, it has been estimated that about 80% of the general population will report low back pain at one point or the other in their life⁷.

Prevention of back pain in youth may contribute to prevention of back pain in adulthood⁸. There is lack of understanding of the risk factors, particularly those associated with activity and with growth and development of adolescent bones and muscles. It is said that decreased muscle flexibility and trunk strength have been postulated as risk factors for low back pain⁹. Poor hamstrings flexibility is a result of low back pain (possibly due to inactivity) rather than a cause¹⁰. The

hamstrings comprise three large muscles, namely semitendinous, semi-membranous and biceps femoris which originate from the infero-medial impression on the upper part of the Ischial tuberosity and get inserted on the upperpart of posterior surface of tibia. They are located in the posterior compartment of the thigh and is responsible for hip extension and knee flexion along with providing stability of the hip and knee joint during walking¹¹.

Muscle tightness is caused by decrease in ability of the muscle to deform, resulting in decrease in the range of motion at the joint on which it act. A shortening of hamstrings muscle may result in limitation of motion of the knee joint, restricting a person ability to walk and run¹².

The hamstrings muscle tightness leads to decrease in range of motion of lumbar flexion. Reduction of hamstrings flexibility was found to be one of the cause for development of Nonspecific low back pain¹³.

One of the method for treatment of shortened hamstrings extensibility is Janda's Muscle energy technique (MET) which works on neurophysiological principles, states that after a muscle is contracted, it is automatically in a relaxed state for a brief latent period. Janda's Muscle Energy Technique (MET) is based on post facilitation stretch (PFS) concept as mentioned by Janda¹⁴. The technique involves a maximal contraction of muscle at mid-range with a rapid movement to maximal length followed by a static stretch¹⁵.

Muscle energy technique (MET) is a manual technique developed by osteopaths that is now used in many different manual therapy professions. It is claimed to be effective for a variety of purposes, including lengthening a shortened or contracted muscle, strengthening muscles increasing the range of motion (ROM) of a restricted joint¹⁶. MET is a procedure that involves voluntary contraction of a patient's

muscle in precisely controlled direction, at varying levels of intensity. It is unique in its application as the client provides the initial effort while the practitioner facilitates the process. The benefits of MET includes restoring normal tone in hypertonic muscles, strengthening weak muscles, preparing the muscle for subsequent stretching, improved joint mobility¹⁷.

Another technique is Myofascial release and it can be defined as the facilitation of mechanical, neural and psycho physiological adaptive potential as interfaced by the Myofascial system. It is a curative tool for treatment of the tightness. Myofascial release is a collection of techniques used for the purpose of relieving soft tissue from an abnormal hold of a tight fascia¹⁸. The technique is directed toward the soft tissues of the body, particularly the muscles and fascia. It is a therapeutic treatment that uses gentle pressure and stretching to facilitate the release of fascial restrictions caused by injury, stress, repetitive use, and traumatic or surgical scarring. The therapist gently lengthens the fibers, following the release of associated restriction throughout the body¹⁹.

Myofascial Technique can restore range of motion and decrease pain, improvement in flexibility thus allowing for the earlier return of function. The goal of Myofascial treatment include the relaxation of contracted muscles and increased circulation in an area of ischemia²⁰.

Materials and Methods

Study Design: The study was experimental design.

Sampling Technique: The subjects were selected by purposive sampling.

Source of Data: Adolescent Girls of schools and colleges in and around Ludhiana.

ELIGIBILITY:

Inclusion criteria

- Subjects between age group of 15-24 years.

- Subjects with history of back pain without any specific etiology like trauma from past 6 months.
- Subjects who were not involved in any routine sports training and conditioning programme.

Exclusion criteria

- Subjects with history of recent trauma of lumbar spine and lower limb.
- Subjects with any pathology of lumbar spine and lower limb.
- Subjects with any surgery of lumbar spine and lower limb.
- Subjects with recent fracture of lumbar spine.
- Non cooperative subjects.

PROCEDURE

Based on Inclusion and Exclusion criteria, 60 subjects having Nonspecific Low Back Pain and Hamstring tightness between age group 15-24 years were selected by purposive sampling and informed consent was taken. Subjects were divided into 3 Groups of 20 each as Group A (Control Group), Group B (Experimental Group 1) & Group C (Experimental Group 2).

Pretest data was obtained by measuring Back Range of Motion (Lumbar Flexion) by using Universal Goniometer and Low Back Dysfunction using Oswestry Low Back Pain Disability .

Group A (Control Group) including 20 subjects were given conventional treatment as Hot Pack on Hamstrings Muscle over the posterior aspect of thigh of both the lower limbs for 10 minutes. Then Lumbar Mobility Exercises was performed by subject. The protocol was of 3 sessions per week for 2 weeks.

Group B (Experimental Group 1) including 20 subjects were given conventional treatment as Hot Pack on Hamstrings Muscle over the posterior aspect of thigh of both the lower limbs for 10 min . Then Lumbar Mobility Exercises was performed by subject. Then, Janda's MET was given on both the lower

limbs one after the other in supine lying with shortened Hamstrings muscle placed in a midrange position as per the restriction barrier between a fully stretched and a fully relaxed state. The patient contracted the muscle isometrically, using a maximum degree of effort for 10 seconds while the effort was resisted completely. On release of the effort, a rapid stretch was made to a new barrier, without any bounce and this was held for at least 10 seconds for 3 repetitions.

The protocol was of 3 sessions for 2 weeks.

Group C (Experimental Group 2) including 20 subjects were given conventional treatment as Hot Pack on Hamstrings Muscle over the posterior aspect of thigh of both the lower limbs for 10 min. Then Lumbar Mobility Exercises was performed by subject.

Thereafter, Myofascial Release was given on both the lower limbs one after the other in

prone lying on shortened Hamstrings using the elbow and forearm (i.e. the hand closest to the body), The compression was applied and the elbow was moved towards the knee joint or inferiorly for 3 repetitions.

The protocol was of 3 sessions per week for 2 weeks.

Pre and Post test data was obtained by measuring Back Range of Motion using Universal Goniometer and for Back Dysfunction, Oswestry Low Back Pain Disability Questionnaire was used.

Material used

Universal goniometer

Oswestry Low Back Pain Disability Questionnaire

Statistically analysis: Data analysis was performed by using paired and unpaired t-test

Result and Discussion

Table 1: Comparison of Pre and Post intervention values of Oswestry Low Back Pain Disability between Group A (Control) and Group B (MET)

Unpaired T Test	Oswestry Scale			
	Pre-Test		Post-Test	
	Group A	Group B	Group A	Group B
Mean	27.10	27.05	26.95	18.00
S.D.	5.71	3.70	5.61	3.17
t-value	0.03		6.20	
Result	NS		S	

p value > 0.05 Non Significant (NS)

p value < 0.05 Significant (S)

Table 1 shows Unpaired 't' test result of Oswestry Low Back Disability between group A and B where Pre intervention Mean±SD of Group A was 27.10±5.71 and that of Group B was 27.05±3.70. The value of Unpaired 't' test as calculated was 0.03 which was less than the table value at 5% level of significance. Therefore, there was statistically non-significant difference between Pre intervention

values of Group A and Group B. Post-intervention Mean±SD of Oswestry Low Back Pain Disability of Group A was 26.95±5.61 and that of Group B was 18.00±3.17. The value of Unpaired 't' test as calculated was 6.20 which was more than the table value at 5% level of significance. Therefore, there was statistically significant difference between Group A and Group B.

Table 2: Comparison of Pre and Post intervention values Oswestry Low Back Pain Disability between Group B (MET) and Group C (MFR)

Unpaired T Test	Oswestry Scale			
	Pre-Test		Post-Test	
	Group B	Group C	Group B	Group C
Mean	27.05	27.45	18.00	22.05
S.D.	3.70	3.64	3.17	2.16
t-value	0.34		4.71	
Result	NS		S	

p value > 0.05 Non Significant (NS)

p value < 0.05 Significant (S)

Table 2 shows Unpaired 't' test result of Oswestry Low Back Pain Disability between group B and C where Pre intervention Mean±SD of Group B was 27.05±3.70 and that of Group C was 27.45±3.64. The value of Unpaired 't' test as calculated was 0.34 which was less than the table value at 5% level of significance. Therefore there was statistically non-significant difference between Pre

intervention values of Group B and Group C. Post-intervention Mean±SD of Oswestry Low Back Pain Disability of Group B was 18.00±3.17 and that of Group C was 22.05±2.16. The value of Unpaired 't' test as calculated was 4.71 which was more than the table value at 5% level of significance. Therefore there was statistically significant difference between Group B and Group C.

Table 3: Comparison of Pre and Post intervention values Oswestry Low Back Pain Disability between Group A (Control) and Group C (MFR)

Unpaired T Test	Oswestry Scale			
	Pre-Test		Post-Test	
	Group A	Group C	Group A	Group C
Mean	27.10	27.45	26.95	22.05
S.D.	5.71	3.64	5.61	2.16
t-value	0.23		3.64	
Result	NS		S	

p value > 0.05 Non Significant (NS)

p value < 0.05 Significant (S)

Table 3 shows Unpaired 't' test result of Oswestry Low Back Pain Disability between group A and C where Pre intervention Mean±SD of Group A was 27.10 ±5.71 and that of Group C was 27.45±3.64. The value of Unpaired 't' test as calculated was 0.23 which was less than the table value at 5% level of significance. Therefore, there was statistically Non-Significant difference between Pre

intervention values of Group A and Group C. Post-intervention Mean±SD of Oswestry Low Back Pain Disability of Group A was 26.95±5.61 and that of Group C was 22.05±2.16. The value of Unpaired 't' test as calculated was 3.64 which was more than the table value at 5% level of significance. Therefore, there was statistically significant difference between Group A and Group C.

Table 4: Comparison of Pre and Post intervention values of the Lumbar Flexion (Goniometer) between Group A (Control) and Group B (MET)

Unpaired T Test	Goniometer			
	Pre-Test		Post-Test	
	Group A	Group B	Group A	Group B
Mean	39.05	38.65	39.30	46.85
S.D.	4.75	3.03	5.00	2.66
t-value	0.31		5.95	
Result	NS		S	

p value > 0.05 Non Significant (NS)

p value < 0.05 Significant (S)

Table no 4 shows Unpaired 't' test result of Lumbar Flexion (Goniometer) between group A and B where Pre intervention Mean±SD of Group A was 39.05 ±4.75 and that of Group B was 38.65±3.03. The value of Unpaired 't' test as calculated was 0.31 which was less than the table value at 5% level of significance. Therefore there was statistically non-significant difference between Pre intervention values of Group A and Group B. Post-intervention Mean±SD of Lumbar Flexion (Goniometer) of Group A was 39.30±5.00 and that of Group B was 46.85±2.66. The value of Unpaired 't' test as calculated was 5.95 which was more than the table value at 5% level of significance. Therefore there was statistically significant difference between Group A and Group B.

Table 5: Comparison of Pre and Post intervention values of Lumbar Flexion (Goniometer) between Group B (MET) and Group C (MFR)

Unpaired T Test	Goniometer			
	Pre-Test		Post-Test	
	Group B	Group C	Group B	Group C
Mean	38.65	38.25	46.85	44.80
S.D.	3.03	3.81	2.66	3.50
t-value	0.36		2.08	
Result	NS		S	

p value > 0.05 Non Significant (NS)

p value < 0.05 Significant (S)

Table 5 shows Unpaired 't' test result of Lumbar Flexion (Goniometer) between group B and C where Pre intervention Mean±SD of Group B was 38.65 ±3.03 and that of Group C was 38.25±3.81. The value of Unpaired 't' test as calculated was 0.36 which was less than the table value at 5% level of significance. Therefore, there was statistically non-significant difference between Pre intervention

values of Group B and Group C. Post-intervention Mean±SD of Lumbar Flexion (Goniometer) of Group B was 46.85±2.66 and that of Group C was 44.80±3.50. The value of Unpaired 't' test as calculated was 2.08 which was more than the table value at 5% level of significance. Therefore, there was statistically significant difference between Group B and Group C.

Table 6: Comparison of Pre and Post intervention values of Lumbar Flexion (Goniometer) between Group C (MFR) and Group A (Control)

Unpaired T Test	Goniometer			
	Pre-Test		Post-Test	
	Group C	Group A	Group C	Group A
Mean	38.25	39.05	44.80	39.30
S.D.	3.81	4.75	3.50	5.00
t-value	0.58		4.02	
Result	NS		S	

p value > 0.05 Non Significant (NS)

p value < 0.05 Significant (S)

Table 6 shows Unpaired 't' test result of Lumbar Flexion (Goniometer) between group C and A where Pre intervention Mean±SD of Group C was 38.25 ±3.81 and that of Group A was 39.05±4.75. The value of Unpaired 't' test as calculated was 0.58 which was less than the table value at 5% level of significance. Therefore, there was statistically non-significant difference between Pre intervention values of Group C and Group A. Post-intervention Mean±SD of Lumbar Flexion (Goniometer) of Group C was 44.80±3.50 and that of Group A was 39.30±5.00. The value of Unpaired 't' test as calculated was 4.02 which was more than the table value at 5% level of significance. Therefore, there was statistically significant difference between Group C and Group A.

Discussion

The data was analysed through paired 't' test for comparison within Group A which gave t-value of Oswestry low back pain disability questionnaire as 1.83, which was not significant with $p > 0.05$. For Group B, t-value was 22.97 and for Group C was 7.18, which was statistically significant with $p < 0.05$. paired t-test values for universal goniometer within group A was 1.751, which was statistically not-significant with $p > 0.05$. For Group B t-value was 38.54 and for Group C was 48.43, which was statistically significant with $p < 0.05$. Thereafter, Unpaired 't' test was applied for Oswestry low back pain disability

questionnaire for comparison between Group A and Group B which gave t- value as 6.20, Group B and Group C 4.71, Group C and Group A 3.64 which was statistically significant with $p < 0.05$. Thereafter, Unpaired 't' test was applied for universal Goniometer for comparison between Group A and Group B which gave t-value as 7.25, Group B and Group C 2.08, Group C and Group A 4.02 which was statistically significant with $p < 0.05$. The result of Group B who received Janda's MET came out to be significant in correlation to the present study shows the comparison of Muscle energy technique (MET) and Post isometric relaxation (PIR) on hamstring flexibility in healthy young individuals with hamstring tightness and concluded that both MET and PIR were effective in increasing popliteal angle and decreasing hamstring tightness in young healthy individuals. The study also showed that MET was better than PIR for improving hamstring flexibility. It occurred due to biomechanical or neuro-physiological changes or due to an increase in tolerance to stretching as mentioned by Talapalli et al.²¹

Another comparative study on the effectiveness of Muscle Energy Technique versus static passive stretching on hamstring tightness in healthy young individuals showed that MET was more effective than static passive stretching in reducing hamstring tightness and improving hamstring flexibility. An increase in flexibility after MET occurred due to biomechanical or neuro physiological

changes or due to an increase in tolerance to stretching. The neurological mechanisms may produce increased range of motion of a joint and increased tolerance to stretch of the hamstring muscles thus, increasing the flexibility following MET. The study concluded that MET significantly improved the hamstring flexibility in collegiate males as mentioned by Desai *et al.*²² Another study was done to find the effectiveness of MFR on pain and hamstring tightness and functional disability in individuals with knee osteoarthritis. The results of the study showed that subjects in experimental group had significant reduction in pain improvement in AKE-ROM and functional disability when compared to conventional group. Thus, increase in AKE-ROM improved hamstring flexibility and reduced functional disability. This study concluded that the reduction of pain after MFR treatment was due to the inhibitory effect on the golgi tendon. The pressure associated with MFR causes the golgi tendon organ to sense a change of tension in the muscles and responds to this high or prolonged tension by reflexively inducing relaxation of muscle spindles as mentioned by Phullaya *et al.*²³ Another study compared the effects of manual Myofascial release and self Myofascial release via foam roller on the hamstring muscles on the athletic population. The study concluded that the individual effects of the release were significant as there was reduction of pain and increased hamstrings flexibility which was measured via sit and reach. Also, significant results were seen in the range of motion, which was measured via the active knee extension and passive straight leg raise as stated by Quadir *et al.*²⁴ The comparison between Group B (Muscle Energy Technique) and Group C (Myofascial Release Technique), showed improvement in Goniometry and Oswestry Low Back Pain Disability Questionnaire. Although both the groups were statistically significant but Group B, who were given Muscle Energy Technique showed better

improvement than group C, who were given Myofascial Release Technique as well as the control group. Therefore, it can be concluded that both the groups – Muscle Energy Technique and Myofascial Release Technique are effective in improving Nonspecific Low Back Pain.

Conclusion

The study concluded that there was a significant variation of values between the Muscle Energy Technique and Myofascial Release on improving Back Pain and Dysfunction in Adolescent Girls with Nonspecific Low Back Pain. Therefore, Alternate Hypothesis was accepted and Null Hypothesis was rejected. Comparison of Post-test mean values revealed that Muscle Energy Technique was better than Myofascial Release in reducing Back Pain and Dysfunction in Adolescent Girls with Nonspecific Low Back Pain.

Limitations

Treatment was given for 2 weeks, therefore long term effects of the treatment could not be noticed.

Sample size was small.

BMI was not considered as criterion during data analysis.

Future Scope of the Study

Study on long term effects of both muscle energy technique and myofascial release can be done.

Further study can also be done to find the effect with other conventional exercise such as combined ultrasound therapy, pain, relieving methods with the both technique.

These two techniques further can be applied on other pathologies.

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