Original Research Article

Comparing the Effectiveness of Muscle Energy Technique, Positional Release Technique and Conventional Therapy on Pain, Range of Motion and Functional Ability in Patients with Mechanical Low Back Pain

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Abstract

Background of the Study: Low back pain is one of the most common health problem and 80% of people experiences low back pain in their lifetime. Majority of low back pain is due to the muscle imbalance. Muscle imbalance occurs due to shortened or lengthened in structure and it leads to injury which causes changes in motor programming.

Objectives: To compare the effects of Muscle Energy Technique, Positional Release Technique and Conventional Therapy on improving pain, range of motion and functional ability in patients with mechanical low back pain.

Subjects and Methods: Twenty four patients of complaining of mechanical low back pain participated in the study. Patients were randomly allocated using computer generator software into three groups: group A which received Muscle Energy Technique, group B which received Positional Release Technique and group C which received Conventional Therapy. Treatment sessions were given three times per week for three weeks. Patients were assessed before and after treatment using Numerical Pain Rating Scale(NPRS),Modified Oswestry Disability Index (MODI), and Modified Schobers Test to assess pain severity, functional ability, and range of motion of lumbar spine respectively.

Results: Based on this statistical analysis, Group A showed better statistically significance in NPRS,MODI and ROM mean values as compared to Group B and C. Hence alternate hypothesis is accepted and null hypothesis is rejected. This we conclude that Muscle Energy Technique is more beneficial compared to Positional Release Technique and Conventional Therapy group.

Conclusion: Muscle Energy Technique and Conventional therapy group shows significant improvement on Pain and Lumbar Extension Range of Motion compared to Positional Release Technique, whereas there was no significant difference in MODI on Muscle Energy Technique, Positional Release Technique and Conventional therapy.

Keywords: Muscle Energy Technique, Positional Release Technique, Conventional therapy.

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Introduction

About 80% of people experiences Low back pain in their lifetime and common reason for medical consultation which interferences with quality of life and work performances[1].In any position – standing, sitting or lying down, human body's Centre of gravity try to balance between muscles and bones to maintain the integrity of structure and protect them against injury. If imbalances occurs between the functional load then typically pain will emerge which will refer as mechanical pain. Mechanical LBP is mostly caused by postural deviation and is higher in workers who involve heavy physical exertion as indirect cause of asymmetrical stress factors increase the biomechanical overload and compromises. Prior evidences have shown that changes in muscle tone create muscle imbalances, which leads to movement dysfunction. Abnormal movement pattern may have direct effect on joint surfaces, thus potentially leading to joint degeneration. Core muscles (Iliopsoas, Quadratus lumborum) arises which provide Support and stability to low back and when these muscles become contracted ,it can alter normal biomechanics of pelvis and lumbar, thoracic and even cervical vertebrae and causes back pain.

Muscle energy technique is an active and direct technique which used to restore muscle length and strength and also acts as a pump for lymphatic system[5]. According to Greenman's, the muscle which is contracting during a Muscle Energy Technique pulls on the bony attachments and begins to mobilize the isolated segment. As the result, the range of motion of joint segment is gradually increased with patient generated forces5. This restores not only joint mobility, but also normal function and physiology of the muscles. Positional Release Technique is an indirect osteopathic technique whereby dysfunction joints and their muscles are moved away from their restrictive barrier into a position of ease in the treatment of both musculoskeletal and visceral dysfunction[6]. In Low back dysfunction there is a development of tight ness and instability which causes pain before complete full normal end range movement[7]. In long-standing and severe cases of Low back pain can develop muscle deconditioning due to spasm and atrophy due to limitation of activities through the body Positional Release Technique can be applied for somatic dysfunction. It reduces delayed onset muscle spasm with the use of PRT. It can also produce immediate changes in pressure pain threshold in symptomatic patients.

Exercise Therapy can be given for patients with low back pain with three distinct goals. The goal is to improve or eliminate impairments in back flexibility, reduce the intensity of back pain and to reduce back pain related disability through process of desensitizing of fears and concerns, altering pain attitudes and beliefs. Most studies has observed improvements in global pain rating after exercise programs and many have observed that exercise can lessen the behavioural, cognitive, and disability aspects of back pain syndromes. Thus, the study is conducted with an aim to find out best technique which include direct technique (Muscle Energy Technique), Indirect Technique (Positional Release Technique) and conventional therapy which will help in improving pain, range of motion and functional ability in Mechanical low back pain individuals.

Need for the Study

Muscle Energy Technique and Positional Release Technique along with Convention al therapy are commonly applied for Mechanical Low Back Pain, but there is lack of evidence on comparing the effectiveness of Muscle Energy Technique, Positional Release Technique and Conventional Therapy on improving pain, Range of Motion, functional ability in patients with Mechanical Low Back Pain and so the study is sought to find the" Comparing the Effectiveness of Muscle Energy Technique, Positional Release Technique and Conventional Therapy on improving pain, Range of Motion and Functional ability in patients with Mechanical Low Back Pain"

Objective:

The main objective of the study was to compare the effects of Muscle energy technique, Positional release technique and conventional therapy program on pain, range of motion and functional ability in patients with mechanical low back pain.

HYPOTHESIS

NULL HYPOTHESIS (Ho): There will be no significant difference among Muscle Energy Technique, Positional Release Technique and Conventional Therapy on pain, range of motion and functional ability in patients with mechanical low back pain.

ALTERNATIVE HYPOTHESISv (Ha): There will be significant difference among Muscle Energy Technique, Positional Release Technique and Conventional Therapy on pain, range of motion and

functional ability in patients with mechanical low back pain.

METHODOLOGYSTUDY DESIGN:

Randomized Controlled Trial

STUDY SETTING:

The study was conducted in the Department of Orthopedics & Department of Physical Medicine and Rehabilitation, PSG hospitals, Coimbatore, Tamil Nadu, India.

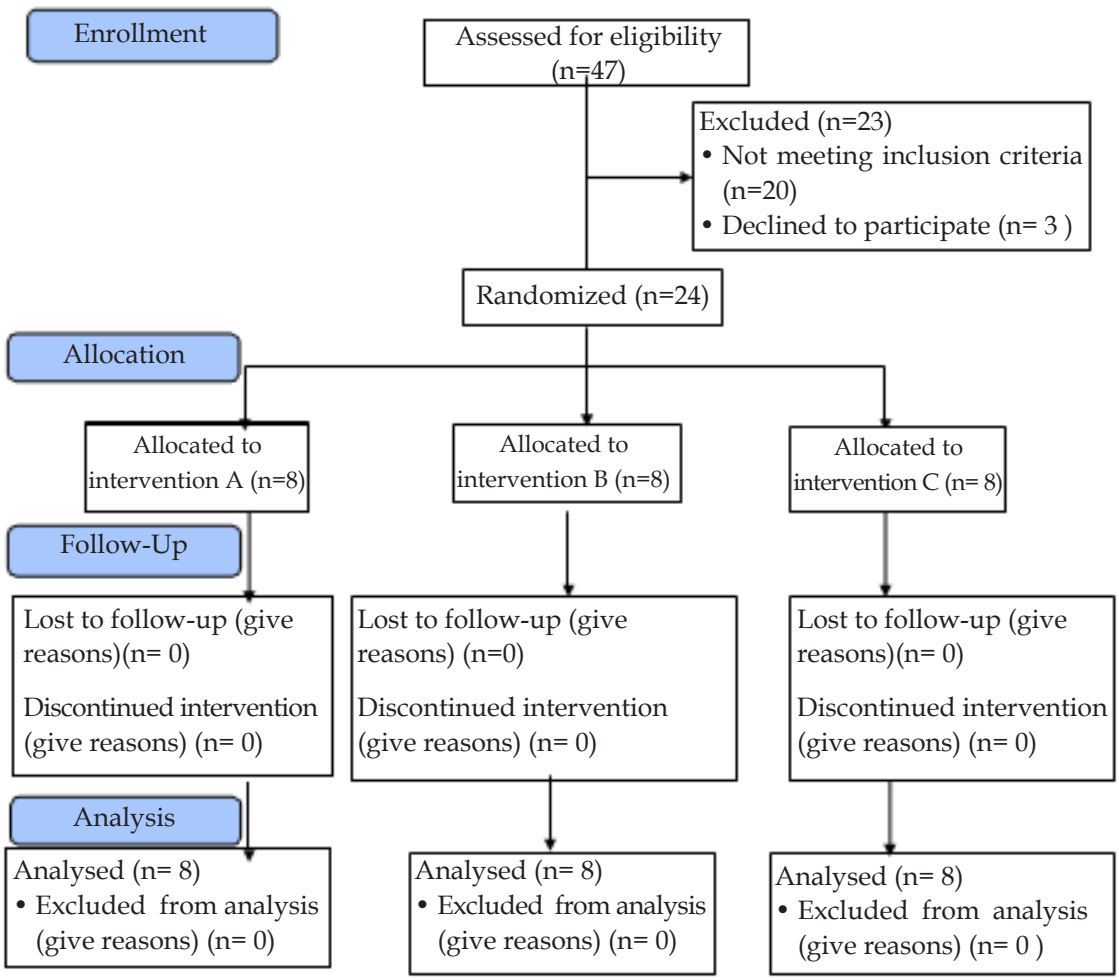
HUMAN PARTICIPATION PROTECTION:

The study was reviewed and approved by Institutional Human Ethics Committee at PSG IMSR, Coimbatore. (PSG/IHEC/2019/Appr/FB/031)

PARTICIPANTS:

24 individuals with Low back pain, age group ranging from 20-45 years were the participants in this study. The inclusion criteria were the following: Age 20 - 45 years, with Low back pain of 12weeks duration, should be medically fit to perform physical training and should give consent to participatein the study. The individuals whomet the following criteria were excluded: Osteoporosis, recent fractures, Structural deformities of spine, Disc pathology, Tumour, Systemic disease, Pregnant women, Radicular symptoms, any other medical conditions contra-indicatory to physical activity. The flow of participants in the study is explained in consort flow chart Figure1.Based on the selection criteria 24 participants were selected using convenience sampling and were randomly assigned using computer generated random numbers in to three groups: **Group A :** Muscle Energy Technique **Group B :** Positional Release Technique **Group C:** Conventional Therapy Figure:1Consort flow chart showing the flow of participants in the study

Figure 1: Consort flow chart showing the flow of participants in the study



INTERVENTIONS:

The details of the intervention[13-19] given for each group are given in the table 1**.**

Table 1: Intervention details

GROUP-A MUSCLE ENERGY TECHNIQUE	GROUP-B POSITIONAL RELEASE TECHNQUE	GROUP–C CONVENTIONAL THERAPY
• Position of the patient • Patient do the movement against the resistance • Hold the breath for 7-10 seconds • Release the breath on slowly ceasing contraction • Release, a rapid stretch is applied to new barrier and held for 10 second • Procedure repeated for 5 times • **Muscle Energy Technique:** 45 mins/ session, 3 days / week for 3 weeks.	• Palpate a tender point • The patient is moved in such a way that the pain associated with pressure on the tender points is relieved by at least 70 percent to find position of ease • Hold position of ease as 90 seconds • Procedure Repeated for 3times • **Positional ReleaseTechnique:** 45 mins/session, 3 days/ week for 3 weeks.	• Interferential therapy • Stretching exercises • Strengthening exercises • Conventional Therapy: • 45 mins/session, • 3 days/week for 3 weeks.

OUTCOME MEASURES

The outcome measures used in this study were Numerical Pain Rating Scale (NPRS), Modified Oswestry Disability Index (MODI) and Modified Schober's Test (MST). The pretest assessment was taken on the first day of intervention by using outcome measures. The Intervention was given to each group separately for 3 weeks. Final assessment was taken after the 3 weeks of treatment using same outcome measures. Comparison of pretest and posttest values with in the group and between the groups was done finally.

STATISTICAL ANALYSIS

Descriptive statistics were used for all variables. Data were evaluated using Multivariate analysis (MANOVA). It assess the independent factors on three dependent variable (NPRS, MODI, Modified schober's test). Homogeneity was tested using the Levene's statistics. The effective size for each MANOVA model was produced using Partial Eta Squared. A value of $p<0.05$ was considered significant. SPSS statistical software 16.0 window was used for all analyses.

The pretest and posttest values for Groups A, B and C was obtained before and after intervention.The pain reduction and improvement in functional ability and range of motion was measured using Numerical Pain Rating Scale (NPRS), Modified Oswestry Disability Index (MODI), and Modified Schobers test. The mean, standard deviation and F values were used to find out whether there was any significant difference between pretest and posttest values within the groups and between the groups.

Results

In this study totally 24 individuals with lowback pain werer andomized into three groups. The baseline characteristics of the participants in all the groups were similar. The base line characteristics of the 24 participants are given in table 2.

Table 2: Baseline characteristics of the participants

	Group A	Group B	Group C	P value
Age(years)	42.66	43.12	42.85	>0.05
Gender				
Male	5	4	5	>0.05
Female	3	4	3	
VAS	7.12	7	6.25	>0.05

Groups A, B & C TABLE: 3 Mean, Standard deviation, Test of between subjects

Dependent variable	GROUPS	Mean(cms)	Standard Deviation	'F' Value	'p 'Value
NPRS	A	7.12	1.126		
Pre-test	B	7.00	1.069	0.778	<0.05
	C	6.25	1.282		
NPRS	A	1.88	.641		
Post-test	B	3.38	.916	1.256	<0.05
	C	3.25	1.389		
MODI	A	47.50	7.151		
Pre-test	B	44.00	7.251	0.290	<0.05
	C	46.00	7.783		
MODI	A	16.75	3.845		
Post-test	B	24.50	10.515	0.031	<0.05
	C	24.75	9.618		
MST(FLEXION)	A	2.25	.707		
Pre-test	B	3.25	1.035	0.568	<0.05
	C	3.00	.756		
MST(FLEXION)	A	5.75	.707		
Post-test	B	5.13	.835	0.421	<0.05
	C	5.63	1.302		
MST(EXTENSION)	A	2.13	.641		
Pre-test	B	2.62	1.061	2.039	<0.05
	C	1.88	.641		
MST(EXTENSION)	A	4.75	1.035		
Post-test	B	4.25	1.282	1.916	<0.05
	C	3.62	.744		

Data were analyzed using MANOVA. In the descriptive analysis, among the three groups, mean values of Muscle Energy Technique (A) group was NPRS (pre=7.12, post=1.88), MODI (pre=47.50, post=16.75), Flexion range of motion (pre=2.25, post=5.75), Extension range of motion (pre=2.13, post=4.75), which shows statistically significant compared to Positional Release Technique(B) and Conventional Therapy groups(C).

Prior to conducting a series of followup MANOVA, homogeneity of variance assumption was tested for all three variables. Based on series of Levene's F test, homogeneity of variance of all scales NPRS (F=1.256, p=0.305 (p>0.05), MODI (F=0.031, p=0.970(p>0.05), Flexion Range of motion (F=0.421, p=0.662 (p>0.05), Extension range of motion (F=1.916, p=0.172(p>0.05) assumption was satisfied.

Multivariate analysis of variance was conducted to test the hypothesis. A Statistically significant MANOVA effect was obtained (F=1.087, p>0.05(p<0.05), Wilks' Lambda

=0.070, Partial Eta Squared=0.735. In between subjects analysis, the groups has a statistically significant effect on NPRS(F=-5.230, p=0.14(p<0.05). But not significant in MODI (F=2.279, p=0.127(p>0.05) Lumbar flexion range of motion (F=0.907, p=0.419(p>0.05), Lumbar extension range of motion (F=2.333, p=0.122 (p>0.06) .

Finally, series of post-hoc analysis (Turkey) were performed to examine individual mean difference comparison across all three levels of variables. The result revealed that NPRS were statistically significant between Groups A and B (p=0.008) p<0.05, A and C (p=0.014) p<0.05.and not significant between B and C (p=.810) p>0.05. MODI was not statistically significant between groups A and B, p=0.355, A and C, p=0.689 and B and C,0.595(P>0.05), Lumbar flexion range of motion was not statistically significant between groups A and B, p=0.217A and C p=0.802 and B and C ,p=0.320(P>0.05). Extension range of motion was statistically significant between groups A and C (p=0.043) p<0.05 and not significant between group A and B (p=0.349) p>0.05 and B and C (p=0.244) p>0.05.

Based on this statistical analysis, Group A showed better statistically significance in NPRS, MODI and ROM mean values as compared to Group B and C. Hence alternate hypothesis is accepted and null hypothesis is rejected. This we conclude that Muscle Energy Technique is more beneficial compared to Positional Release Technique and Conventional Therapy group.

Discussion

The study was undertaken to compare the effectiveness of Muscle Energy Technique, Positional Release Technique and Conventional Therapy on decreasing pain, improving range of motion and improve functional ability in patients with Mechanical Low Back Pain. The result of this study revealed that group A (MET) is effective in reducing pain severity, increase in functional ability and lumbar range of motion as compared to other groups (PRT, CT). In between subject analysis, the groups have a statistically significant improvement in the reduction of severity of pain by giving these three interventions to the patient with Mechanical Low Back Pain.

In this study, NPRS shows statistically significant in group A (Muscle Energy Technique) and this result was supported by the finding of the Selkowetal., found MET may be better than any other technique in reducing pain and increases range of motion for several patients because it uses a low-force isometric contraction in pain free position. Post-isometric relaxation technique uses a contract relax method with an added gentle stretch. Agonist contraction activates Golgi tendon organ, which in turns target muscles and break pain-spasm pain cycle[23]and also this study findings supported by Ulger et al.,. Compared Muscle Energy Technique and exercise in patients with chronic low back pain at the end of the treatment, MET was found more effective in reducing pain and functional ability[24.]

In between subject analysis, PRT group shows statistically improvement in NPRS thereby it results in decrease in pain severity this findings agree with the Meseguetal., found there was a reduction in pain in PRT groups due to analgesic effect of PRT may be attributed to the relaxation of the damaged tissue which achieved by placing patient in a position of sensitizing inflammatory mediators and he concluded that the application of PRT may be effective in producing hypoanalgesic and decrease there activity of tender points and this findings also has been supported by Albert et al.,. Compared immediate effect of strain counter strain in treatment of tender points in theupper trapezius and found that it was effective in reducing tenderness o tender points inupper trapezius[24]. The reduction of pain can be

achieved by using PRT within 3 weeks duration and these findings agree with the study of Wong et al.,. Conducted study to assess the effect of SCS on tender points and strength of hip muscles and he conclude that SCS reduces trigger point pain[25]and this study also supported the findings of Pedowitzetal. That use of Counter-strain an athlete can experience reduction in pain and capable of returning to full activity in less than 3weeks from initiation of treatment

Conventional Therapy also shows statistically significant in NPRS. In this study, we gave standard physiotherapy program of stretching and strengthening exercises. There was a significant reduction of pain in conventional therapy groups and this finding agree with the study of Liddle SD et al., .stretching exercises reduces muscle tension and relieve the compression on muscle nociceptors and on the nerve root and it broke the vicious circle also it decreased cellular connective tissue in muscle e and decreased muscle stiffness which leads to reduction of pain[27] and Wittink et al.,. Strengthening exercise has a role in the reduction of pain by increases plasma concentration level of beta endorphins and activation of ergo receptors which stimulate enkephalinergic nerve cells in the thalamus which decreases the pain and improve functional activities.

Generally, exercise therapy brings wellness in many aspects like promoting relaxation, improving flexibility, strengthening and self-confidence, overcoming the fear about pain and decreasing the illness behavior. James Rayville et al. In their study suggest that exercise may be used as a tool to lessen excessive fear and concern about back pain and alter stifling pain attitudes and beliefs and overall literature suggest that exercise treatment is more effective in treating depression than no treatment than and as effective as psychotherapy and antidepressant medication[12] Sullivan et al., (2000) who stated that improvement in physical activity and pain severity responsible for decrease disability and increases range of motion[29].

In our study, lumbar range of motion is statistically significant in group A and C (MET and CT). The result of this study is supported by the Brinda et al., compared the effects of MET to the CT and both treatments were similarly effective in reducing low back pain[30]and also this finding supported with Schenk et al.,, performed a randomized CT to determine effectiveness of MET in Lumbar extension in symptomatic individuals and showed that MET were able to increase Lumbar Extension compared to compared to control groups[31].

The participants in this study were in the age group of 20 to 45 years, so the generalizability of the results was reduced. The Future studies can be done with large number of samples. And, other muscles which are prone for tightness in this conditions can also be included in the intervention in future studies.

Conclusion

Thus the study concluded that muscle energy technique and conventional therapy techniques are useful in reducing pain and increasing extension range of motion for individuals with low back pain. So the therapist could use both the interventions for the low back pain condition.

Funding Sources No external funding

Ethical Clearance: The study was reviewed and approved by Institutional Human Ethics Committee at PSG IMSR, Coimbatore. (PSG/IHEC/2019/Appr/FB/031)

Declaration of Conflicts of Interest: No conflict of interest for any of the authors of this study

References

1. BalagueF, MannionA F, Pellise F, Cedraschi C.Non-specific low back pain. Lancet (London, England) .2012Feb;379(9814):482–91.
2. LizierDT, Perez MV, SakataRK. Exercises for treatment of non specific low back pain. RevBras Anestesiol. 2012;62 (6) :838–46 .
3. Phil D. The Janda Approach [Internet]. 2014.Available from: http : // www janda approach . com /
4. Fryer G, Assistant A. Research-informed Muscle Energy Concepts and Practice. :57–62.
5. Greenman, P.: Principles of Manual Medicine. Philadelphia, PA: Lippincott, Williams,and Wilkins;3rd ed., 2003.
6. D'Ambrogio K J, Roth GB. Positional Release Therapy: assessment and treatment of musculoskeletal ldysfunction. St Louis, Missouri, USA: Mosby,Vol.2 No 1,February 15,2014

7. Campbell C, Muncer SJ. The causes of low back pain: a network analysis. Soc Sci Med.2005 Jan;60(2):409–19.
8. DvirZ, KeatingJL. Trunk extension effort in patients with chronic low back dysfunction Spine (PhilaPa1976). 2003 Apr; 28(7):685–92.
9. Lewis C, Flynn T. The Use of Strain-Counterstrain in the Treatment of Patients with Low Back Pain. J Man Manip Ther. 2001 Jan 1;9:92–8.
10. Hutchinson, J.R.: An investigation into efficacy of strain counter strain technique to produce immediate change in pressure pain threshold in symptomatic subjects. Int. J.OsteopathicMed.2008 9 (4),113-119,Price,D,D,Bush
11. vanTulder M, Koes B, Bombardier C. Low back pain. Best Pract Res ClinRheumatol.2002Dec;16(5):761–75.
12. RainvilleJ, HartiganC, MartinezE, LimkeJ, JouveC, FinnoM. Exercise as a treatment for chronic low back pain. Spine J. 2004;4(1):106–15.
13. Eldin E, Abd M, Ibraheem E. Conventional therapy versus positional Release tech-nique in the treatment of chronic low back dysfunction.2017;5(5):2325
14. FryerG.Muscle energy technique:An evidence-informed approach.2011;14(1):3–9.
15. Ellythy MA. Efficacy of Muscle Energy Technique Versus Strain Counter Strain on Low Back Dysfunction. 2012;17(2):29–35.
16. Shi wi AMFE.Effect of therapeutic cexercises with or without positional release technique in treatment of chronic mechanical low back pain patients: a randomized controlled trial. Vol. 38, Egyptian Journal of Occupational Medicine. 2014;38(2) : 125-139
17. Dhargalkar P, Kulkarni A, Ghodey S. Added Effect of Muscle Energy Technique for Improving Functional Ability in Patients With Chronic Nonspecific Low Back Pain. Int J Physiother Res. 2017;5(3):2082–7.
18. Rishi P, Arora B. Impact of Muscle Energy Technique Along With Supervised Exercise

    Program Over Muscle Energy Technique on Quadratus Lumborum and Iliopsoas on Pain and Functional Disability in Chronic Non Specific Low Back Pain. Int J Physiother Res. 2018;6(3):2748–53.
19. Selkow NM, Grindstaff TL, Cross KM, Pugh K, Hertel J, Saliba S. Short-term effect of muscle energy technique on pain in individuals with non-specific lumbopelvic pain:a pilot study. J Man Manip Ther. 2009;17(1):E14-8.
20. Williamson, A., & Hoggart, B. (2005). "Pain: a review of three commonly used pain rating scales." J ClinNurs 14(7): 798-804
21. LambaD, UpadhyayRK. Comparison between modified oswestry low back pain disability questionnaire and a berdeen low back pain scale taking low back-specific version of the sf- 36 physical functioning scale as a gold standard in patients with low back pain. Asian J Pharm Clin Res. 2018;11(11):97–9.
22. Amjad F, Mohseni Bandpei MA, Gilani SA, Arooj A. Reliability of modified-modified Schober's test for the assessment of lumbar range of motion. J Pak Med Assoc. 2022 Sep;72(9):1755-1759.
23. Ulger O, DemirelA, OzM, Tamer S. The effect of manual therapy and exercise inpatients with chronic low back pain: Double blind randomized controlled trial. J Back Musculoskelet Rehabil. 2017 Nov;30(6):1303–9.
24. Meseguer, A.A., Fernández-De-Las-Peňas, C., Navarro-Poza, J.L., Rodrìguez-Blanco,C., and Gandia, J.J.B.: Immediate effects of the strain counterstrain technique in local pain evoked by tender points in the upper trapezius muscle. Clin Chiropr, 9(3): 112-118,2006.
25. Albert AM, Jose LN. Immediate effects of the strain Counter strain in local pain evoked by tender points in upper trapezius muscle. Clinchiropractic.2006:9:3:112-118.
26. Wong, C.K. and Schauer-Alvarez, C.: Effect of strain counter strain on pain and strength in hip musculature. J Man Manipulative Ther, 12(4): 215-223.
27. Pedowitz, R.N.: Use of osteopathic manipulative treatment for iliotibial band friction syndrome. Journal of the American Osteopathic Association;105(12): 563-567, 2005.
28. Liddle SD, Baxter GD, Gracey JH. Exercise and chronic low back pain: what works? Pain. 2004 Jan;107(1-2):176-90. doi: 10.1016/j.pain.2003.10.017. Erratum in: Pain. 2004 May;109(1-2):200-1.
29. Sullivan MS, Saraf LD, Riddle DL. The relationship lumbar flexion to disability in patients with low back pain physical therapy2000; 80(3):240-250.
30. BindraS.A study on the efficacy of muscle energy technique as compared to conventional therapy on lumbar spine range of motion in chronic low Back pain of sacroiliac origin .Human Biol Rev. 2013;2 (4):13.
31. Schenk R, Adelman K, Rousselle J. The effects of muscle energy technique on cervical range of motion. J Man Manip Ther. 1994;2(4):149-155.