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COMPARATIVE STUDY OF IMMEDIATE AND SYSTEMIC EFFECTS OF ACTIVE RELEASE TECHNIQUE AND MYOFASCIAL RELEASE ON THORACIC SPINE

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ABSTRACT

Objective: The main objective of this study was to compare the immediate biomechanical (increase extensibility of tissues for increase of range of motion) and systemic (decrease in pain level) effects of active release technique and myofascial release on thoracic spine.

Methodology: A quantitative double blind study was conducted by following a research design of randomized control trial. Screen out total 180 students from DPT department of LIMS College by using NPRS, thoracic ROM (digital Inclinometer application), occiput to wall distance (OWD) and spine functional index questionnaire. There were 40 students meet inclusion exclusion criteria. They were equally divided into two groups, group 1(n=20) and group 2(n=20). Group 1 receives active release technique and Group 2 receives myofascial release technique. Both groups receives infrared as baseline treatment. Measurements were recorded before and immediate after application of treatment. Statistical analysis was performed on SPSS version 22.

Results: Wilcoxon signed ranks test, Mann-Whitney U test, independent sample t test and paired sample t test was used to compare the values. Both treatment options show significant results but when compare both groups for these effects then results were non-significant.

Conclusions: Improvement for thoracic pain, thoracic ROM and occiput to wall distance was found in both myofascial release technique and active release technique groups. However, no significant difference was observed between both groups.

Key Words: Active release technique, Myofascial Release Therapy, thoracic spine pain.

INTRODUCTION

Thoracic spine pain or upper back pain, can be defined as a pain localized in the area of middle back or upper back, between T1-T12 vertebrae, across the trunk's posterior aspect, TSP can be incapacitating, producing same types of burdens on working subjects, community, and population. Evidence suggests that there is a high prevalence of TSP among undergraduate students 13–39%. A cohort study of a Swedish university students revealed that the one year incidence of thoracic spine or neck pain was 15% (Bikbov, et al., 2020). A systemic review reveals that thoracic spine pain is a frequent condition in general population and there is evidence shows certain association between thoracic spine pain and physical, social, emotional and environmental risk factors such as musculoskeletal pain, growth, lifestyle, usage of backpack (Briggs, et al., 2009).

Thoracic spine pain was noted by 27% of respondents after a year, and 23% of them continued to have symptoms. The presence of female gender, low neck extensor muscle endurance, and a high percentage of mouse use during computer work were associated with an increased risk of thoracic spine pain. Persistent symptoms were predicted in female students who were in their second year of study and who used computers with their elbows unsupported (Kanchanomai et al., 2013).

Postural disturbances leads to thoracic spine pain and decrease functional status and posture disturbances are very common in some occupations in which repetitive work required in sustained position such as manual physiotherapists, students, computer workers. Poor posture can cause pain, alter the proprioception of muscles, joint deteriorations. In response to these change muscles react by becoming weak, tight, short and inhibited. Phasic muscles always becoming weaker and

postural muscles tends to tight, this imbalance of muscles leads to postural disturbances and thoracic spine pain (Thacker, et al., 2011).

There are many treatment options to manage the myofascial pain and one of them is myofascial release techniques (MRT). It is a soft tissue manipulation technique in which low intensity force is applied for prolonged time period to improve the tissue extensibility (elasticity), reduce myofascial restrictions, myofascial lengthening and break adhesion which automatically leads to improve the range of motion and reduce pain. This technique used to treat myofascial structures effectively to provide biomechanical (increased range of motion and increase tissue elasticity, neuronal and systemic (local vs. distal effects, decrease pain) Interoceptive effects (increase awareness of body) (Bialosky, et al., 2009).

Active release technique (ART) is a manual therapy technique which is used to improve function of soft tissues by releasing scar tissues, break adhesions, improve tissue extensibility, and reduce pain and stiffness. ART is mainly technique in which put pressure on a specific restricted tissue site with performing movement from its shortened position to lengthen position. ART can improve elasticity, plasticity and viscosity of tissues. Extensibility of tissues can improve range of motion, reduce pain and stiffness on thoracic spine (Kim et al., 2015).

Thoracic pain is prevalent due to spending prolonged sitting or standing hours in an awkward posture. Many researches have been performed to assess the effectiveness of tissue manipulation techniques like myofascial release and active release techniques on lumbar spine pain but there is a lack of researches to assess the effectiveness of these techniques on whole thoracic spine pain from T1-T12. Separately, different research has been performed on both techniques, but there is no research performed to compare the effectiveness of these two soft tissue mobilization techniques. Hence, there is a lack of literature on these two soft tissue release techniques and their biomechanical and systemic effects on the thoracic spine. So main rationale of this study was to compare immediate systemic and biomechanical effects of active release technique and myofascial release on thoracic spine.

METHODS

Design

This study was a double blinded randomized controlled trial with blinded assessors and blinded patients conducted through the use of non-probability purposive sampling technique. The study protocol was approved from the Institutional Review Board of The University of Faisalabad (TUF/DR/MSPP/301, dated June, 14, 2021). The study conformed to the CONSORT guidelines for reporting of RCTs and was in line with the contents of the Declaration of Helsinki. Informed consent was taken from all research participants after explanation of research procedure to them.

Physical therapy students having thoracic spine were recruited from Lyallpur Institute of Management and Sciences Faisalabad. Patients were evaluated for eligibility according to inclusion and exclusion criteria. Sample size of 40 calculated with 20 subjects in each group by the use of formula (Dahiru, et al., 2006). The participants in Group A received the Active release technique and participants in Group B performed and Myofascial release. Primary outcome

measures including Numerical Pain Rating Scale, thoracic ROM and Occiput to wall distance measurement. This study is reported according to the recommendations of the CONSORT Statement.

Participants

The inclusion criteria were: participants having thoracic spine pain from last 2 weeks, age range between 16-25 years, NPRS ranges from mild, moderate to severe, limited range of motion of thoracic spine, decreased functional status due to thoracic spine pain, occiput to wall distance greater than 1.5cm. Participants were excluded if participants were having any hypermobility syndromes of spine, joint fracture or spinal instability, any history of trauma/malignancy of the spine, any bone disease, any skin disease, any auto immune disease. Spinal functional index was used for screening of participants with thoracic spine pain and decreased with spinal functions.

Interventions

Baseline Treatment

Patient was assume side lying position and apply infrared for 10 minutes to each patient as a baseline treatment to both group participants.

Experimental Group

Group A participants performed Active release technique for trapezius muscle to treat the thoracic spine pain and increase mobility to improve ROM and decrease pain. Patient was sit on a chair or stool, hands rest in lap, therapist stand behind the patient and stable the shoulder with one hand. Patient neck in extension then find the tender area on treated muscle put deep pressure on this area with thumb and ask the patient to actively flex and turn the neck (Oh and Hwangbo, 2018). Three sessions, each session include 3 repetitions and allow 2 minutes rest periods after each session. After completion of three sessions measure the VAS, ROM and OWD.

Control Group

Group B participants received myofascial release. The patient was sit on stool and therapist stand behind the patient to treat the thoracic area. Knuckles, thumbs or ulnar border of palm was used to apply pressure for 60 seconds on thoracic spine. While applying pressure asked the patient to do respective movement. Slowly move both hand knuckles from top to bottom to release upper trapezius, rhomboids, middle trapezius and lower trapezius. Ask the participant to perform neck flexion slowly while performing MFR. Furthermore, ask the participant to perform protraction, shoulder adduction on one side and then both sides in combination. Repeat this technique 5 times for each movement

Outcome Measures

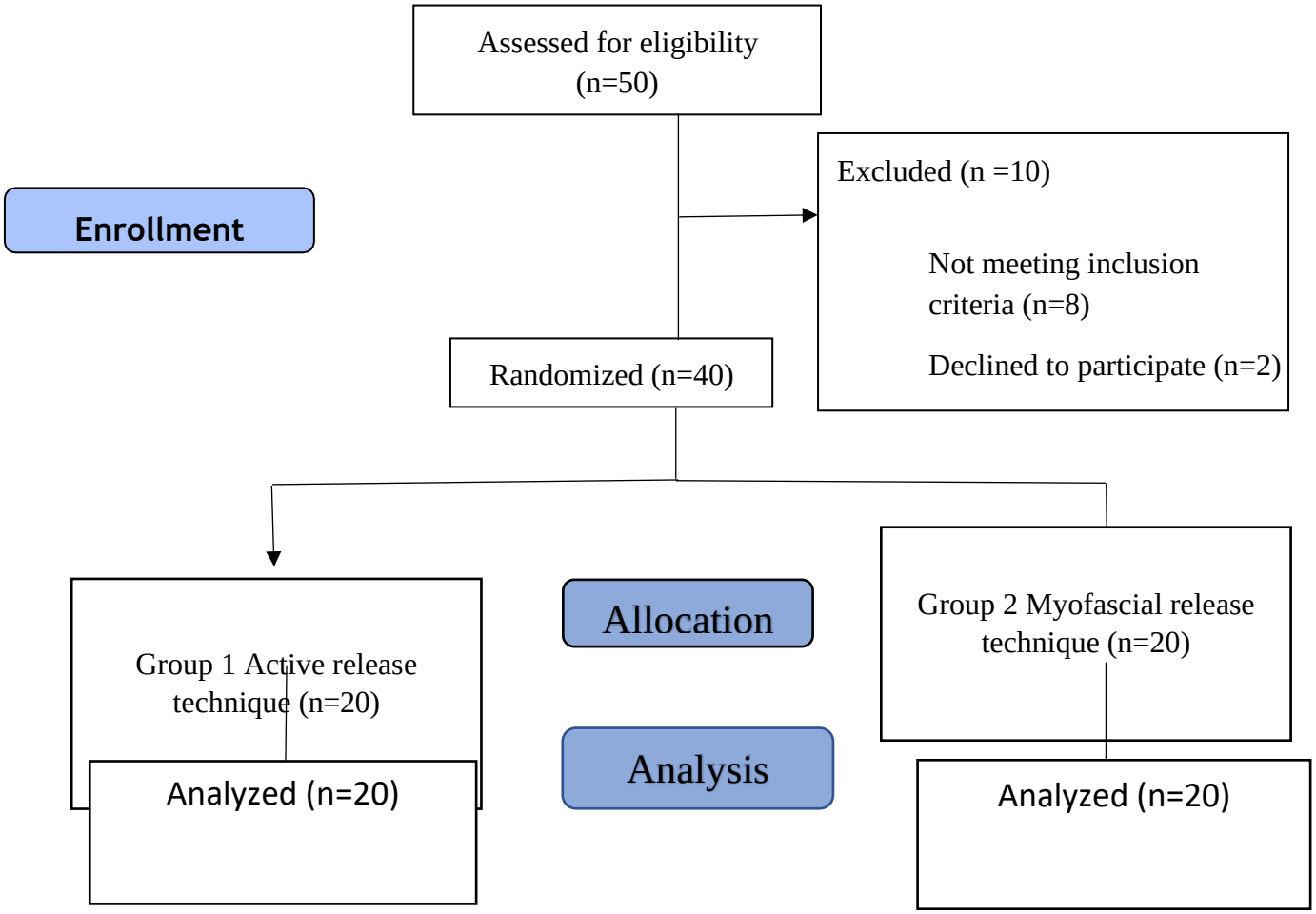
The outcome measures were pain measured by Numeric pain rating scale (Oh and Hwangbo, 2018), Thoracic ROM by Inclinometer app (Oh and Hwangbo, 2018), Occiput to wall distance measurement (Wiyanad, et al., 2018).

Data Analysis

Statistical analysis was performed through SPSS version 22. A Shapiro-wilk test was used to confirm that the data was normally distributed. ROM and NPRS data was not normally distributed to apply non parametric tests and OWD data shows normality so apply paired sample t test and

independent sample t test for this variable. In the study, the patient's age and treatment group were independent variables, whereas the dependent variables were pain, thoracic ROM, occiput to wall distance , and health-related quality of life. The data was examined using SPSS version V. 25.

3.1 CONSORT FLOW DIAGRAM



RESULTS

Deviations from the study protocol

The trial procedure was followed exactly. Every participant received their randomly assigned intervention, the registered research question was answered, and all registered outcomes were monitored at the prearranged intervals.

Flow of participants through the study

Compliance with the prescribed regimen was not assessed. 50 potential participants were screened. Ten participants were excluded comprising of 8 who did not fulfil the research inclusion criteria and 2 who declined to participate. 40 participants with thoracic spine pain were randomized into two groups: Experimental Group (n = 20) and Control Group (n = 20). The flow of participants through the trial is demonstrated in Figure 1. There was no permanent loss to follow-up, when all trial participants were measured at the post-treatment time points, as indicated in Figure 1.

Characteristics of the Participants

Table I: Demographic features of the subjects

Parameters		**Sample Statistics**
Age in Years (Mean ± SD)		20.15±2.23
Gender f(%)	Male	12 (30)
	Female	28 (70)

Above table shows the demographic features of the sample. The mean ± SD of age was 20.15±2.23 years. There were 70% percent females and 30% males in the sample (Table No. 1)

Table II: Tests of Normality

Pre-Treatment Variables	**Kolmogrov Smirnov Sig**	**Shapiro Wilk Sig.**
NPRS	.000	.000
Thoracic Flexion ROM	.002	.003
Thoracic Extension ROM	.000	.000
Occiput to Wall Distance	.200	.456

The above table describes test of normality of all outcome measures at pre-treatment. Shapiro-Wilk significance values above than 0.05 means that that data is normally distributed. Shapiro-Wilk significance values was found above than 0.05 for OWD. Shapiro-Wilk significance values were found less than 0.05 for NPRS, thoracic flexion ROM and thoracic extension ROM.

Table III: Within Group Analysis Of NPRS, Thoracic ROM, & OWD

Outcome Measure	Group 1		**p-value**	Group 2		**p-value**
	Baseline	**Post Treatment**		**Baseline**	**Post Treatment**	
NPRS	19.70	20.73	0.000	21.30	20.78	0.000
Thoracic Flexion ROM	22.70	22.58	0.000	18.30	18.43	0.000
Thoracic Extension ROM	21.23	19.75	0.000	19.78	21.25	0.000
Occiput to wall distance	2.76±.81	2.31±.76	0.000	2.86±.78	2.43±.81	0.000

Above table demonstrates within group analysis of different scales at baseline, and post treatment. Mean and mean rank values improved at post treatment readings for all outcomes in both groups with 0.000 p value.

Table IV: Between Group Analysis of All Outcome Measures

Outcome Measure	**Session**	**Group 1 (Mean Rank)**	**Group 2 (Mean Rank)**	**P-value**
NPRS	**Baseline**	19.70	21.30	.640

	Post treatment	20.73	20.78	.894
Thoracic Flexion ROM	**Baseline**	22.70	18.30	.225
	Post treatment	22.58	18.43	.251
Thoracic Extension ROM	**Baseline**	21.23	19.78	.673
	Post treatment	19.75	21.25	.663
Outcome Measure	**Session**	**Group 1 (Mean±S.D)**	**Group 2 (Mean±S.D)**	**P-value**
	Baseline	2.76±.81	2.86±.78	.694
	Post treatment	2.31±.76	2.43±.81	.619

Above table shows between group analysis at baseline, and at post treatment of all outcome measures. There was no significant difference in NPRS score, thoracic flexion ROM, thoracic extension ROM and occiput to wall distance at baseline and also at post treatment with p values ≥ 0.05 (Table IV).

DISCUSSION

The main aim of this study was to determine the effective treatment option between active release technique and myofascial release to improve the thoracic spine biomechanical and systemic effects that are tissue extensibility, elasticity indirectly refers to thoracic range of motion and pain level respectively. Both techniques have shown positive results to improve range of motion and decrease pain but there is no significant difference between these two treatment options, therefore null hypothesis is accepted.

A study sought to investigate the biomechanical, systemic, and interoceptive effects of myofascial release technique on the thoracic spine. Twelve healthy volunteers were randomly assigned to one of three counterbalanced sequences of conditions: the MFR condition, the control condition, or a sham. Three outcome measures were used: range of motion (ROM), pain pressure thresholds (PPT), and interoceptive sensitivity (IS). There were notable improvements in both local and distal PPT as well as ROM, following MFR surgery. The increase in ROM raises the possibility that the MFR altered the biomechanical properties of tissue elasticity, leading to a rise in tissue flexibility. An overall systemic response to the therapy is suggested by the increase in the PPT's local and distal sites (Cathcart, et al., 2019). The study has similar findings with the present study by showing the beneficial effects of myofascial release over spinal ROM and pain.

There is scarce literature on the direct or comparative effects of myofascial release and active release technique on thoracic pain. Most researches have been conducted on back pain, neck pain and upper crossed syndrome. So, the critical analysis of the current study will be done in light in of comparing it with studies over back pain.

Another study was done investigating the efficacy of techniques to treat spinal combined with myofascial release compared to spinal manipulation alone, in individuals with chronic low back pain (CNLBP). Seventy-two individuals were enrolled and randomly assigned to one of two groups: (1) spinal manipulation and myofascial discharge (SMMRG; n = 36) or (2) spinal manipulation alone (SMG; n = 36). Spinal integration (characterized by velocity / low amplitude thrusts) of the sacroiliac and lumbar spine and myofascial release of the lumbar and sacroiliac

muscles vs manipulation of the sacroiliac and lumbar spine alone, twice a week for three weeks. Tests were performed initially, at three weeks and after three months for follow-up. The main outcomes were pain and disability. The secondary outcomes were quality of life, depressive pain severity. No significant differences were found between SMMRG vs SMG in pain severity and follow-up disability. Spinal manipulation combined with myofascial release was less effective compared to spinal manipulation alone in patients with CNLBP (Schiller, 2001). The study has concurrent findings with the present study by showing the positive effects of myofascial release over spinal pain.

Another research was conducted to evaluate the effects of myofascial release technique against active release technique for myofascial pain syndrome of the low back. 45 participants were randomly assigned to three groups. Group A received both traditional physiotherapy and active release method. Group B received both conventional physiotherapy and myofascial release. The only traditional physiotherapy that Group C (control group) received was in the form of strengthening and stretching exercises. The Ronald Morris Disability Questionnaire was used to gauge the function disability of the back, and the digital algometer was used to assess pain pressure threshold. Following treatment, a comparison of the groups revealed that group A had a significantly lower Ronald Morris disability Questionnaire score than groups B and C and notable improvement in the PPT was observed. In low back myofascial pain syndrome, the active release treatment improves back function better than myofascial release (Abd Elsadek et al., 2023). The study presents findings contrary to the current study where active release technique and myofascial release techniques had no significant differences, no group was found superior to each other in improving thoracic pain.

CONCLUSION

The current study measured the comparison between the immediate biomechanical and systemic effects of active release technique and myofascial release technique. Both treatment options showed improvement in thoracic pain, thoracic ROM and occiput to wall distance. But, no significant difference was observed in both groups for thoracic pain, thoracic ROM and occiput to wall distance.

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