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Abstract

Purpose: Trigger points are localized, hyperirritable areas term as "Knots" and are palpable in taut band of muscle fibers, tendon or a ligament. To compare the effects on Post facilitation stretching and Active release technique on pain, pain pressure threshold and level of patients' satisfaction in upper trapezius trigger points.

Methodology: It was a quasi-experimental study with sample size of 30 and convenient sampling was used. Inclusion criteria of study were females and males of age 25 to 40 years, positive jump sign and persistent pain for more than 4 months. Study setting was the physical therapy departments of private hospitals of Faisalabad and Lahore. Study duration was 6 months. Out of 30 patients 15 were enrolled in group-A (baseline therapy and Post facilitation stretching) and remaining 15 were enrolled in group-B (baseline therapy and Active release technique). Pain pressure threshold was measured by algometer, Intensity of pain was assessed by NPRS before and after the treatment of one week and patient satisfaction was measure by PSQ-18 after the treatment. Data was analyzed by software SPSS 24. Demographic data and test statistics was presented in form of tables.

Findings: Out of 30 patients, 33.3% were male and 66.7% were females. Wilcoxon Signed-Rank Test for within-group analysis revealed a significance difference ($p \leq 0.05$) in NPRS and PPT before and after the treatment in both groups. Mann-Whitney U test for between-group analyses showed the $p > 0.05$, which means that no significant differences was observed in results produced by Post facilitation stretching in group A and Active release technique in group B.

Recommendations: A significantly reduction in the pain intensity and enhancement in pain pressure threshold was observed in both groups. Both Post facilitation stretching and active release techniques were equally effective in reducing intensity of pain, improving pain pressure threshold in upper trapezius trigger points and patients of both groups showed equally satisfaction level after the treatment. Informed by targeted intervention theories, the study utilized rigorous research methodologies for validation. Practitioners are advised to undergo specialized training for PFS and ART application, ensuring a tailored approach per individual needs. Policymakers should set stringent licensing standards and promote continued research to bolster the techniques' efficacy and widespread adoption.

Keywords: *Active Release Technique, Myofascial Trigger Points, Post Facilitation Stretching, Pain Pressure Threshold*

1.0 INTRODUCTION

Myofascial pain syndrome is one of the major cause of cervical pain caused by formation of myofascial trigger points in muscle structures which are localized, hyperirritable areas term as “Knots” that are palpable in taut band of muscle fibers, tendon or a ligament (1). On palpation give rise to jump sign, local tenderness and twitch response. Their pain spread when pressed or moved results in referred pain (2). Myofascial pain is the significant musculoskeletal problem experienced by 85% of general population once in their lifetime with the prevalence of approximately 46%. This prevalence also seems to be related to age and gender. People aged 30 to 60 years have a prevalence of 37% (male) and 65% (female), while older than 65 years have a prevalence more than 80% (3). MTrPs of the trapezius muscles have prevalence of 93.75%. Active MTrPs of multifidi, levator scapulae, splenius cervicis and right and left trapezius muscle muscles have prevalence of, 77.68%, 82.14%, , 62.5%, 82.1% and 79% respectively (4).

Trigger points will have an effect on movement by keeping muscles short and stiff that reduces ROM, they will maintain spams in muscles. Examination of the trigger enhances the pain of patient, and therefore the pain radiates in a pattern characteristic of the specific muscle (5). Trigger points have both the ability to be in active or latent stages. Latent MTrPs are muscle Knots that often restrict movement pattern, cause stiffness and weakness which cannot be observed unless pressed and may remain untreated for many years. These latent MTrPs can transit to active MTrPs. This is the painful phase that produces symptoms which includes referred pain pattern in position other than area of the painful stimulus from a MTrPs. This referred pain is well-defined and marked with constant pattern of pain (6).

Evidence based practice provide broad spectrum approach to release the myofascial trigger points in the field of physical therapy. In past, physiotherapists applied different treatments like ischemic compression, taping, spray and stretch technique, hot and cold packs, post-isometrics relaxation, deep tissue massage, trigger point injections (wet or dry needling), Acupuncture (7). Many therapists consider electrical modalities. Laser and ultrasounds therapy are also effective to deactivate the trigger points. In addition, many therapists in their clinical practice are introducing METs, active release technique and strain-counterstain technique for this purpose (8).

Muscle energy techniques name as “active muscular technique” was developed by Fred Mitchell, Sr. osteopathic physician. MET decrease pain sensitivity to painful stimulus and increase fluid drainage. . Post facilitation stretching is a type of Muscle energy technique (9). Dr Vladimir Janda presented Post Facilitation Stretch technique which is based on concept of autogenic inhibition (10). Autogenic inhibition MET provides self-induced inhibition with negative feedback against muscle tears involving Golgi tendon organ as receptor. This reduced the contraction of muscle and cause elongation with the help of autogenic reflex, this decreases the efferent signals to the muscles that is the major factor for elongation of muscles. This type of technique uses much less muscle contraction (25%) followed by stretching. This includes maximum muscle contraction at mid-range which follows fifteen seconds static stretch of same muscle. (11). The active release technique is a manual procedure for restoring soft tissue functionality that involves the elimination of scar tissue, that can cause mechanical disruption in the skeletal muscles, fascia, and connective tissue, as well as discomfort, stiffness, muscular weakness, and aberrant sensations. ART distinguishes from other manual interventions in that it integrates precise motion of the patient (lengthening the muscle via ROM) with site-specific applied pressure (12).

Previous literature (13-16) shows that, Post facilitation stretching and active release method are two manual treatment procedures often utilized by healthcare practitioners to address myofascial disorders in various regions of body. Despite their widespread use, the existing literature on manual therapies for

trigger point management primarily focuses on individual approaches; there is a lack of comprehensive research comparing the effects of post facilitation stretching and active release technique in elimination of trigger points within the upper trapezius muscle. Therefore, the main objective of the study was to explore the comparative effects of post facilitation stretch and active release technique on pain, pain pressure threshold and patient satisfaction in upper trapezius trigger points. The purpose of this study was to fill a gap in the literature by conducting a comparative analysis of these two techniques, thereby providing evidence-based guidance for healthcare practitioners, including physical therapists and manual therapists, in making informed decisions about the best approach for trigger point management and optimizing patient outcomes. The study was guided by the theory that targeted interventions can influence physiological responses in upper trapezius trigger points. Validation was achieved through rigorous research methodologies, and comprehensive statistical analyses to ensure the findings were robust and reliable.

2.0 METHODOLOGY

Study Design and Selection Criteria

It was an analytical comparative study. Study design was quasi experimental. Sample size was calculated through Epi-info software. The study period was 6 months. Convenient sampling technique was used for recruitment of participants. Study settings were the physical therapy departments of private hospitals of Faisalabad and Lahore. The duration of this study was 6 months. Inclusion criteria of the study were both female and male gender of Age 25 to 40 years. Trigger points with all its characteristics and positive jump sign and persistent pain for more than 4 months. Exclusion criteria of the study were patients with any congenital deformity of head, neck and upper limb, patient with history of trauma, fractures and surgery, patients with neurological symptoms, patients with history of any metabolic disease, patients with any diagnosed psychological problem and participants not willing to sign the consent form for study.

Before participation, each patient was required to sign an informed consent form. Participants were assigned conveniently in 2 groups, each group with 15 subjects. All participants had been screened for the existence of trigger points in the trapezius muscle and had met the inclusion criteria. Group A had received baseline treatment along with post facilitation stretching intervention and group B had received baseline treatment and active release technique. Both groups had received baseline treatment of moist hot pack for 15 minutes. Three sessions of interventions were given on alternate days for one week. Pre-treatment data was assessed before administrating baseline therapy and intervention with one week follow up.

Interventions

Post Facilitation Stretching

The patient was lying supine; the therapist places one hand on the shoulder joint. The patient's head was flexed, laterally bent away from, and rotated towards the side of involvement while being supported by the opposing arm. The muscle was maintained in a neutral position throughout the while. By pressing up on the therapist's hand and attempting to shrug, the patient firmly contracts the trapezius muscle. After holding the contraction for ten seconds, the patient releases. Then the muscle was quickly stretched by carefully sliding the shoulder straight inferiorly. The stretch was hold for ten to fifteen seconds and three to five repetitions were performed (17).

Active Release Technique

The patient sat on an elevated surface with his hands on his thighs. The physical therapist positioned behind the patient, placing one hand on the patient's shoulder, stabilizing it. The neck was stretched, and

a deep tension stretch was executed with the thumb across the sore region by making contact with the trapezius muscle. After that, the patient was instructed to flex and turn his neck. Three to five repetitions were performed (18).

Outcome Measures

The algometer was used to quantify the pain pressure threshold (in Kg/cm2), a numeric pain rating scale was used to assess pain, and The Patient Satisfaction Questionnaire Short Form (PSQ-18) was utilized to assess patients' satisfaction. An algometer can be used to determine the amount of pressure needed to cause symptoms involving trigger points as well as nearby soft tissues. PPT evaluation using algometry is a reliable way to assess a subject's discomfort. The assessments revealed high between and within session reliability (ICC > 0.87), (ICC > 0.91) respectively (19).

The NPRS is a segmental arithmetic variation of the VAS in which the subject selects a number from 0 to 10 that best indicates the degree of his or her discomfort (20). The VAS and NRS exhibited a substantial positive relationship ($r = 0.92$, $p<0.001$), with high agreement as demonstrated by the Bland-Altman method (21). The Patient Satisfaction Questionnaire Short Form (PSQ-18) is a brief, validated measure which contains 18 items of seven dimensions of satisfaction, that may be used in a variety of situations and for comparing treatment methods (22).

Statistical Analysis

Data was analyzed by software SPSS 24.0. The normality of the data was evaluated by using the Shapiro wilk test. Non-parametric test including Wilcoxon Signed-Rank Test was used for within group analysis and Mann-Whitney U test was used for between group analyses. Demographic data and test statistics was presented in form of tables

Ethical Consideration

All ethical considerations were taken into account. Prior to the trial, individuals signed a consent form. The safety of the research subjects was assured. Participants' dignity was emphasized. All personal information was kept private.

3.0 FINDINGS

Table 1: Demographic Statistics

Demographic Statistics (n=30)		**f(%)**
Age	25-32y	17(56.7%)
	33-40y	13(43.3%)
Gender	Male	10(33.3%)
	Female	20(66.7%)

Table 1 shows the demographic statistics of study participants. Out of 30 patients, 33.3% were male and 66.7% were females. Age was divided into two categories, 56.7% patients were from the age of 25 to 32y, and 43.3% were of the age 33 to 40y.

Table 2: Test of Normality

Shapiro Wilk test			
	Statistic	**df**	**Sig.**
Numeric pain rating scale at baseline	.899	30	.008
Pain pressure threshold (right) at baseline	.880	30	.003
Pain pressure threshold (left) at baseline	.916	30	.022
PSQ-18	.904	30	.011

The normality of the data was evaluated by using the Shapiro wilk test (Table 2), the data is considered to be normality distributed if the significance value of the test statistics is greater than 0.05, the Shapiro wilks test gives the best value for the data having sample size below 50. By looking at the data, it can be seen that the NPRS and PPT and PSQ-18 are violating the assumptions of normal distribution so, for the analysis of data of NPRS and PPT nonparametric tests i.e., for within group analysis Wilcoxon Signed-Rank Test and for between group analysis Mann-Whitney U test were used. For between group analysis of PSQ-18 Mann-Whitney U test was utilized.

Table 3: Within group analysis of NPRS and PPT

Wilcoxon Signed-Rank Test						
		N	**Mean & SD**	**Median**	**Standardized Test Statistics**	**Asymp. Sig. (2-tailed)**
Post Facilitation stretching	NPRS pre-treatment	15	6.20±1.08	6.00	-3.530	0.000
	NPRS post-treatment	15	2.86±1.12	3.00		
Active release technique	NPRS pre-treatment	15	5.93±1.22	6.00	-3.474	0.001
	NPRS post-treatment	15	2.80±1.43	3.00		
Post Facilitation stretching	PPT (R) pre-treatment	15	0.65±0.35	0.61	3.408	0.001
	PPT (R) post-treatment	15	2.04±0.31	2.09		
	PPT (L) pre-treatment	15	0.73±0.40	0.73	3.408	0.001
	PPT (L) post-treatment	15	2.05±0.32	2.05		
Active release technique	PPT (R) pre-treatment	15	0.54±0.33	0.46	3.408	0.001
	PPT (R) post-treatment	15	2.04±0.50	2.10		
	PPT (L) pre-treatment	15	0.54±0.33	0.46	3.408	0.001
	PPT (L) post-treatment	15	2.04±0.31	2.09		

Table 3 shows the within group analysis of pain intensity on NPRS and pain pressure threshold. For group A, the data shows that mean of NPRS at baseline was 6.20±1.08 and after one week it was reduced to 2.86±1.12. For group B, NPRS prior to treatment was 5.93±1.22 and after one week it was reduced to 2.80±1.43. Pain pressure threshold of right upper trapezius in group A was 0.65±0.35 at baseline and after one week it was increased to 0.65±0.35. At left side PPT was 0.65±0.35 at baseline and after week increased upto 2.05±0.32. In group B, pain pressure threshold at right upper trapezius was 0.54±0.33 at baseline and it increased to 2.04±0.50 after the treatment session of one week. And on left side, PPT was 0.54±0.33 prior to treatment and increased to 2.04±0.31 after one week. The table shows the significant values of NPRS and PPT in both groups were below 0.05, which means that a significantly reduction in the pain intensity and improvement in PPT was observed in both groups.

Table 4: Between Group Analysis of NPRS, PPT and Patient Satisfaction

	NPRS Post Treatment	PPT (R) Post Treatment	PPT (L) Post Treatment	PSQ-18 Post Treatment
Mann-Whitney U	105.000	108.000	110.000	106.500
Wilcoxon W	225.000	228.000	230.000	226.500
Z	-.321	-.187	-.104	-.250
Asymp. Sig. (2-tailed)	.749	.852	.917	.803

Table 4 shows the between group analysis of NPRS, PPT and Patient satisfaction. Results shows the significance value above 0.05, that means that no significant difference was observed in results produced by Post facilitation stretching in group A and Active release technique in group B. Both techniques were equally effective in alleviating pain intensity, improving pain pressure threshold and satisfaction level of both groups showed equally satisfaction level after the treatment of one week. The means patient satisfaction in group A was 78.73±9.98 and in group B it was 77.86±9.85.

Discussion

Myofascial pain syndrome is often caused by formation of trigger points in muscle structures which are localized, hyperirritable areas term as “Knots” and are palpable in taut band of muscle fibers, tendon or a ligament (1). The purpose of the research was to compare the impacts of Post facilitation stretching and Active release technique on pain, pain pressure threshold and level of patients’ satisfaction in upper trapezius trigger points. In present study, Wilcoxon Signed-Rank Test showed a significance difference ($p \leq 0.05$) in NPRS and PPT before and after the treatment in both groups.

In line with these result, in 2017, G Sadria et al. showed that MET and ART had rapid benefits for patients in each group who had latent trigger points in the upper trapezius, including improved active neck lateral flexion ($P < 0.001$), lowered severity of pain on VAS ($P < 0.05$), and lessened trapezius muscle thickness ($P < 0.01$) (23). JH Kim supported with the findings of the recent study, stating that ART for the treatment of chronic NP can be a good option for neck discomfort or pain and cervical mobility (24). In recent study, outcome measures were pain, pain pressure threshold and patient satisfaction but pre-post findings revealed a substantial difference in post-facilitation stretching and active release method. So far our

knowledge, no research was found to measure the patient satisfaction level after applying the interventions of muscle energy technique and active release technique.

According to the findings by AH Alghadir et al. the combination therapy (MET + ICT) showed more significant results as compare METS+conventional therapies) and conventional therapy alone, improved neck discomfort and tenderness in upper trapezius active MTrP (8). In recent study post facilitation technique of MET was not applied in combination with any other manual therapy but found to be equally effective as active release technique. Another study by D Mishra et al. reported that ART performed better than MFR in treating the patients with Trapezius Spasm. However in current study when ART compared with PFS no significant difference was found between both techniques (25).

In recent study, no statistical significant difference was observed in results produced by Post facilitation stretching in group A and Active release technique in group B. G Sadria et al. supported these findings and repored neither manual technique—ART or MET—was more effective than the other in reducing the signs and symptom of TrPs in trapezius muscle (23). RK Abd Elrazik Gad Elhak et al., on the other hand, found a statistically significant difference in in favor to muscular energy treatment for carpal tunnel syndrome. The study found that both techniques improved median motor nerve conduction and grip force. However, as compared to the active release approach, the muscular energy technique increased motor nerve conduction velocity and pinch grip muscle strength and provided more substantial outcomes. (26).

Limitations

Because of resource constraints and time constraints, the study had a smaller sample size. The one-week follow-up period in the study may have limited the ability to assess the long-term effects of post facilitation stretching (PFS) and active release technique (ART) on upper trapezius trigger points. The study lacks blinding, which may introduce bias into the results.

4.0 CONCLUSION AND RECOMMENDATIONS

Conclusion

In conclusion, A significantly reduction in the pain intensity and improvement in pain pressure threshold was observed in both groups. Both Post facilitation stretching and active release techniques were equally effective in reducing intensity of pain, enhancing pain pressure threshold in upper trapezius trigger points and patients of both groups showed equally satisfaction level after the treatment.

Recommendations

- Further research with a larger sample size and longer-term follow-up assessments is recommended to gain a more comprehensive understanding of treatment outcomes.
- More research is needed to focus on other outcomes such as patient posture, Craniovertebral angle, and so on.
- Randomized clinical trials with single, double, or triple blinding are recommended for future research.

Conflict of Interest

None

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