ORIGINAL ARTICLE

EFFECTIVENESS OF DRY NEEDLING ON THE LUMBAR PARASPINAL MUSCLE IN PATIENTS WITH MECHANICAL BACK PAIN: A RANDOMIZED CONTROLLED TRIAL

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ABSTRACT

Objective: The aim of this study was to compare the effect of dry needling and sustained pressure in the lumbar paraspinal trigger points in terms of pain threshold and muscle length.

Methodology: Fifty patients were randomly allocated in experimental and control group having lumbar paraspinal muscle trigger points. Experimental and control groups received dry needling and sustained pressure along with stretching and strengthening exercises. Patients were assessed at 1st pre-and 4th post session using Oswestry disability index, paraspinal muscle length, visual analogue scale and pain pressure threshold using algometer.

Results: Pain pressure threshold and visual analogue scale showed significant results whereas Oswestry disability index and paraspinal muscle length showed no significant results ($P>0.01$). Analysis within the group showed significant difference from pre-to post intervention level ($P<0.01$) in terms of pain pressure threshold, paraspinal muscle length, Oswestry disability index and visual analogue scale in experimental and control group.

Conclusion: Pain was improved using dry needling. However, no significant improvement was seen in patient's disability and lumbar paraspinal muscle length.

Key words: Dry needling, Oswestry disability index, Paraspinal muscle, Trigger points, Visual analogue scale.

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INTRODUCTION

Myofascial pain is a type of pain that emerges from muscles and related fascia which is typically related to myosfascial trigger points (MTrP). [1] MTrPs are hyperirritable spots in taut bands of skeletal muscles. Compression of the involved area elicits pain that may be radiating or localized in nature, produces local twitch response, painful on stretching along with other associated symptoms. [2] MTrPs can be categorized into active and latent, which are clinically different from one another. Active trigger points have referred pain and reproduces symptoms familiar to patient pain pattern evident in different musculoskeletal issues. On other hand, latent myofascial trigger points are tender points produces local twitch response, local or referred pain on manual examination and is not familiar or known by the patient. [3]

MTrP is considered as primary cause of most musculoskeletal pathologies. A research study conducted in united states reported that 30 to 85% of patients has MTrP as primary source of pain (1). Low back pain has a lifetime prevalence of 60%-80% among adult people and the most prevalent of all musculoskeletal concern in the western countries. [4,5] Erector spinae is the most common muscle prone to muscle spasm and cause low back pain. Trigger point present at erector spinae muscle results in radiating pain to buttock all the way from hip bone to the bottom crease. Muscles next to the spine are known as paraspinal muscles. A study conducted in Malaysia by Chen and nizar concluded that 63.5% patients having chronic low back exhibiting MTrP in lumbar paraspinal muscles and piriformis as a common source of pain. [6] One of the minimally invasive procedures used to treat MTrP is dry needling. In this procedure acupuncture needles are insert-

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ed at the site of taut bands or trigger points at the basic course of anatomy. [1]

There is no study present till now in which comparison of dry needling and sustained pressure was compared at lumbar paraspinal muscles. A study conducted on sustained pressure and dry needling at cervical region recommended additional research on sustained pressure and dry needling with high quality study design and more conclusive evidence. [7] The objective of this study is to compare the effect of dry needling and sustained pressure in the lumbar paraspinal trigger points in terms of pain threshold and muscle length.

MATERIAL AND METHODS

A randomized control trial was conducted at Riphah international hospital Islamabad and Pakistan railway general hospital Rawalpindi. The trial registration no is NCT04043741. The current study was approved by Riphah International University Ethical Committee (Riphah/RCRS/REC/00490).

Fifty patients diagnosed with lumbar paraspinal trigger points were randomly allocated into control (n=25) and experimental group (n=25). Informed consent was taken from each participant prior to participation. The study inclusion criteria were age from 20-50, patient having acute, sub-acute, chronic low back pain, Mechanical low back pain and radiculopathies caused by foramen encroachment and traumatic disc herniation up to one year and those patients having active spontaneously painful or latent requiring palpation to reproduce the characteristic pain MTrPs. However, Patients that were using any medication to reduce the pain and/or have any side effect on the skeletal muscle including analgesics, anticoagulants, and muscular relaxants, taking other treatment in the same period of the research, pregnant female, patients with Chronic Disease (kidney disease, Diabetic, and osteoporosis) and spinal diseases (herniated disc, spondylolisthesis) were excluded.

Patients were assessed on 1st pre-and 4th post session by using Visual analogue scale (VAS), Oswestry Disability Index (ODI) and Algometer to determine pain, disability and pain pressure threshold respectively.[5,8,10] Paraspinal muscle length (PML) was measured with the measuring tape. In paraspinal muscles length assessment, patients adopted sitting position.

The anterior superior iliac spine (ASIS) was palpated bilaterally and the patient was instructed to flex forward to produce pelvic tilt. When ASIS started to move, this was considered the end of thoracolumbar flexion and initiation of anterior pelvic tilt. According to Janda, patient forehead needs to come 10 inches of the knees normally. [11]

Screening for lumbar paraspinal myofascial trigger points was performed using manual palpation to assess whether myofascial trigger points were a contributing factor to the patient's reported low back pain. According to Travel and Simons, L1 trigger point is present at Iliocostalis muscle at upper lumbar level where pain is referred downward concentrating at mid-buttock, whereas, L2 trigger point is present at Multifidus muscle. On palpation, pain radiates anteriorly to the abdomen, that can be easily misjudged as of visceral origin. [12]

Prior to the procedure, signing the informed consent forms was done to satisfy the ethical requirements. After Ruling out any absolute contraindication, 4 sessions of trigger point dry needling at lumbar paraspinal muscles was done in experimental group on alternate days with exercise plan including stretching and strengthening exercises (3 sets into 15 reps). Same exercise plan was guided for home plan.

For lumbar paraspinal muscles dry needling, patient was asked to lie in a prone position. Skin was thoroughly cleaned using a cotton swab. The examiner palpated the muscle to recognize the taut band, and hyperirritable spot. Stainless steel filiform needle was used to perform the procedure of dry needling. By using flat palpation method, needling tube was fixed on targeted point at 45 degree; and needle was gently loosened from the tube. The apex of the needle was tapped allowing the needle to penetrate the skin deeply. [13] Once the needle had penetrated into the muscle, it was manipulated. Entire procedure took approximately 15- 20 minutes.

In control group, preceding the treatment, hot pack was applied at low back (15 mins). Four sessions of sustained pressure at lumbar paraspinal muscles were done on alternate days with exercise plan including stretching and strengthening exercises (3x15sets). Same exercise plan was guided for home plan. Sustained pressure is a manual release technique in trigger point therapy. During the procedure, clinician lengthened the muscle up to the increasing resistance within the comfort zone, and then gradually applied gentle pressure on Trp until fingers felt a definite increased in tissue resistance (first barrier). Patient felt only discomfort but no pain. Pressure was maintained at this point until clinician sensed relief of tension under palpating finger. This maneuver was continued until new barrier or more of the tension was released. [14]

The sample size of the study was calculated 50 using OpenEpi. [12] Data analysis was performed at SPSS version 20. The normality of data was checked by using Shapiro-Wilk test. At baseline and end values between the groups Mann-Whitney's test was applied for non-normal data whereas for pre-and post-values comparison within the groups Wilcoxon test was applied for non-normal data.

RESULTS

The study has been designed and reported in accordance to the consort guidelines (15). The final sample

was composed of 50 subjects, randomly allocated 25 participants in experimental group and 25 in control group. All patients received allocated intervention. Loss of follow-up in experimental group was 3 and in control group it was 4. (Figure.no:1)

Percentage of active, latent, L1 and L2 myofascial trigger points in control and experimental groups are shown in detail in (Figure no-3 and 4) respectively.

In the baseline comparison between the two groups, parametric test was applied. Pain pressure threshold showed no significant difference in first pre-session with the P value 0.267. Mean of experimental group and control group is shown in the (Table.no:1) In the baseline comparison between the two groups, non-parametric test was applied. PML, VAS and ODI showed statistically no significant difference. Paraspinal muscle length in first pre-session had a P value of 0.659 while the VAS P value was 0.236 and ODI in first pre-session P value was 0.059. Mean rank and IQR in experimental and control group is shown in (Table no-1)

Post intervention comparison between the two groups the non-parametric test was applied. The PPT and VAS show statistically significant difference and ODI had no significant difference. PPT in last session mean rank was 28.32 in experimental group and in control group mean rank were 15.38 with IQR 22 (3) having P value 0.001.

VAS in last session mean rank was 14.43 in experimental group and in control group, the mean rank was 29.93 with IQR 1 (2) having P value of 0.000. ODI in last session mean rank was 19.00 in experimental group and in control group mean rank was 25.14 with IQR 4.4 (20.8) having P value 0.105. At the end, for comparison between the two groups, Independent T test was applied. PML in last session shows no significant difference with the mean 17.1±3.04 in experimental group. And the mean of control

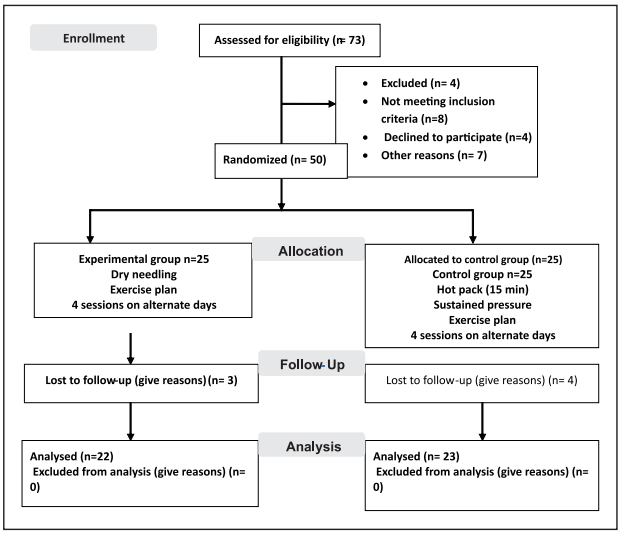

Fig 1: Consort flow chart

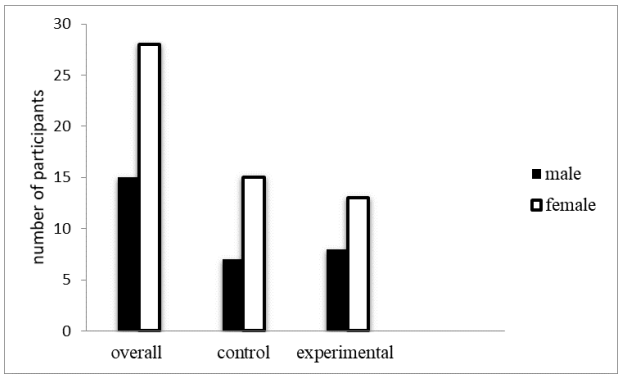

Fig 2: Number of participants according to gender in two groups

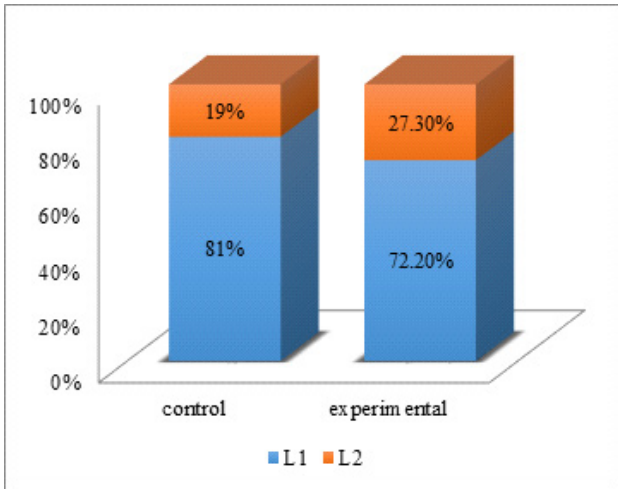

Fig 3: Percentage of Trigger point L1 and L2 in two groups

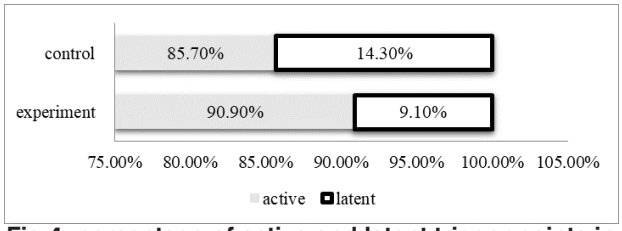

Fig 4: percentage of active and latent trigger points in two groups

group was 18.2±1.76 with the P value 0.140. The comparison of pre-and post-values of PPT, PML, VAS and ODI in control group showed statistically significant difference. Pain pressure threshold, para spinal muscle length and VAS have P-value < 0.01.

DISCUSSION

Trigger points are distinct, focal, hyperirritable spots located in a taut band of skeletal muscle. They produce pain locally and in a referred pattern and often accompany chronic musculoskeletal disorders. [16] A major number of patients having low back pain has MTrPs as a common source of pain in lumbar paraspinal muscles.

Table 1: Changes in hematological parameters in study sample (n=101)

Variables	Groups	Mean ±SD	P Value	
Pain pressure threshold (IIb)	Control	13.4±2.30	0.267	
	Experimental	14.2±2.33		
Variable	Group	Mean rank	IQR	P Value
Paraspinal muscle length (inches)	Experimental	21.18	20(3)	0.659
	Control	22.86		
Visual analogue scale	Experimental	24.07	7(1)	.236
	Control	19.83		
Oswestry disability index	Experimental	25.52	48.8(28.9)	0.059
	Control	18.31		

[17] In 2015, Shane L. Koppenhaver et al. conducted a research to find out the post needling intervention changes in lumbar Multifidus muscle function and pain sensitivity in patient responders versus non-responders. Sixty-six patients having low back pain ultrasound measurements and PPT with Algometer of lumbar Multifidus muscle were measured at pre-session, immediately after dry needling intervention, and after one week. ODI was also measured in these patients. It was concluded that the pain sensitivity was significantly decreased (mention p-value) one week post dry needling sessions and improvement in ODI scoring was observed. The results of this study support the outcomes of our study in relations to ODI and PPT improvement in experimental group post session. [18]

In 2014, María J. Mejuto-Vázquez, PT et al. conducted a research study on short term outcomes in patient with acute neck pain having MTrPS after dry needling in terms of nociceptive sensitivity and cervical ROM. PPT, cervical ROM and NPRS were recorded at 10 minutes and 1 week after intervention. They concluded that single session of trigger point dry needling group provides short term outcomes with improved PPT and cervical ROM and decreased NPRS. The previous study supports the result of this study as after dry needling session, many of patients after single session of TrP dry needling had improved PPT and decreased VAS. [19]

In 2016 Muhammad sharifullah et al. conducted a research study in RG hospital of Pakistan. The researchers compared the effects of sustained pressure and ischemic pressure in improving chronic myofascial pain. After getting 8 sessions of ischemic compression and sustained pressure by cases and controls, NPRS readings showed that both groups had improved pain symptoms but there was no noteworthy advancement in pain relief among sustained pressure and ischemic pressure groups. The results of this study support the findings of the current study as in control group, after taking 4 sessions of sustained pressure along with conservative management, there was decrease in VAS in majority of patients. [20]

CONCLUSION

It is concluded that both sustained pressure and dry needling are effective treatment options for treatment of myofascial trigger points in lumbar paraspinal muscle. Dry needling decreases the pain as shown on the value of pain pressure threshold and visual analogue scale. However, Dry needling does not show any significant improvement in patient disability and lumbar paraspinal muscle length.

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AUTHOR'S CONTRIBUTION

Following authors have made substantial contributions to the manuscript as under

Zia A:	Manuscript writing, concept, Study Design
Sajjad AG:	Data collection, Writing
Hafeez A:	Manuscript writing, Study Design
Altaf S:	Overall supervision, and approval of the final version.
Khan N:	Data collection, helping in manuscript writing
Malik RJ:	Data collection, helping in manuscript writing

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.