





Original Article

# Comparison of the effectiveness of dry needling with dry cupping at upper trapezius muscle in patients with myofascial trigger points.

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## Abstract

**Background:** Trigger points are palpable nodules or irritable spots present in the skeletal muscles, painful upon pressure. This study is concerned with the pain in the upper Trapezius muscle due to the formation of myofascial trigger points and to make a comparison of the effectiveness of dry needling with dry cupping for treating upper trapezius myofascial trigger points.

**Methodology:** Myofascial trigger points were diagnosed in 30 individuals in the upper trapezius. Subjects were randomized into Group-A (n=15) and Group-B (n=15) using the coin toss method. Patients were evaluated at baseline and after the termination of intervention using the Numeric Pain Rating Scale (NPRS), Neck Disability Index (NDI) and cervical joint range of motions (ROM). Patients from both groups received three sessions of treatment on alternate days in one week.

**Results:** Patients with both interventions resulted in significant improvement of NPRS ( $p=0.001$ ), NDI ( $p=0.001$ ), and cervical ranges of motion ( $p=0.001$ ). However, between groups comparison of outcome measure showed no significant difference in NPRS ( $p=0.990$ ), NDI ( $p=0.359$ ), cervical flexion ( $p=0.457$ ), cervical extension ( $p=0.382$ ), right cervical lateral flexion ( $p=0.250$ ), left cervical lateral flexion ( $p=0.792$ ), right cervical rotation ( $p=0.336$ ), and left cervical rotation ( $p=0.242$ ) of motion.

**Conclusion:** The pre-and post-intervention results have concluded that both treatment methods effectively treat myofascial trigger points. There was no significant difference between the two groups for numeric pain rating scale, neck disability index scoring and cervical range of motions.

## Keywords

Dry Needling, Dry Cupping, Myofascial Trigger Points, Trapezius Muscle, Neck Disability Index, Numeric Pain Rating Scale.



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## Introduction

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Pain in the human body is always associated as a symptom of any underlying condition, and it is one of the vital signs<sup>1</sup>. Not only it indicates some pathological condition, but also it provokes the person to withdraw from that damaging situation (like up and down paths), while the body heals and avoid such incidents in future. The musculoskeletal system is often affected by pain, by disrupting its normal function and smooth movement. As a result, obstructing normal biomechanical movements of the body.

Neck pain is a very common condition, more than third of a billion people around the world have neck pain<sup>2</sup>. It can be due to muscular imbalances and biomechanical disorders. It has various etiologies, cervical spondylosis, degenerative disc disease, herniated disc, and muscular strain are among these. It can also be caused due to certain infections such as Tuberculosis and Meningitis. Some common muscular conditions which directly affect the neck muscles are fibromyalgia and polymyalgia rheumatic. Studies suggest that musculoskeletal trigger points are commonly present in patients who have neck pain<sup>3</sup>. Neck pain is one of the widely spread muscle imbalance is long-lasting and affects all age groups and social groups<sup>4</sup>. Whether it is due to the nature of the occupation, physique of the person or the level of physical activeness. A trigger point is always associated with a tender point located in a tight band of muscle fibers. Whenever a myofascial trigger point (MTrP) is touched, it elicits pain. Trigger points can be classified into latent and active points<sup>5</sup>. Both types of MTrPs can cause a decrease in optimal biomechanical capacity. Its management has become a serious concern in the scientific research<sup>6</sup>. Several research have tried to examine MTrPs, which have resulted in the formulation of a variety of treatments<sup>7,8</sup>. Some of which are manual therapy techniques, massage, dry needling, and cupping therapy. Therapeutic techniques that are largely used to manage myofascial trigger points are trigger point injections<sup>9</sup>, dry needling, and acupuncture<sup>10</sup>.

When a needle is inserted during dry needling, the patient may feel a slight sting at the punctured site for a second, and it resolves quickly. Sometimes muscular twitch is observed, but it is brief. A muscle twitch is mostly observed due to the presence of a myofascial trigger point at that site. Dry needling is mostly not used as a single treatment option. Usually, manual therapy techniques also support the management of myofascial trigger points<sup>11</sup>. Dry needling improves the biomechanical control of the cervical region and spine, but dry cupping improves the range of motion of the spine. It should be considered that both treatment options can be utilized on a single patient for better ROM and NDI scoring. As every treatment option may carry some side effects, dry needling may only be used when the needle is sterile and used once. The dry needle must be discarded properly immediately after the session and not be reused.

Similarly, the other treatment option is dry cupping for the management of MTrPs. Cupping therapy is an ancient form of treatment dating back to Egyptian times. Most recently, it has been an established part of modern alternative medicine therapies. Chinese medicine has been tested over this form of an alternative medicine<sup>12</sup>.

Dry cupping is done by applying either glass, bamboo, silicon, or ceramic cups over the affected part of the body<sup>13</sup>. It is used for muscle pain, muscular tension, restricted joint range of motion, headaches, or back pain. When a cup is placed upon the treatment area, a vacuum is created through a pump attached to the cup. This vacuum allows the fresh blood to pool in that region and pulls up the underlying pathological agents. This surge of fresh blood and nutrients will heal the underlying myofascial trigger point<sup>14</sup>.

Manual therapy techniques, dry cupping, and dry needling were studied in a systematic review in 2019. To alleviate myofascial trigger points and myofascial pain, they identified a small number of randomized controlled trials in which manual therapy was used. They reported that dry needling effects vary from very poor to intermediate compared to control, sham therapies or other

procedures, and there was scarce data for effects of dry cupping. Limitations were ambiguous methodologies, high risk of prejudice, insufficient blinding, no control group, and small sample sizes<sup>15</sup>.

The present study is concerned with the pain in the upper Trapezius muscle due to the formation of myofascial trigger points and to make a comparison of the effectiveness of dry needling with dry cupping for treating upper trapezius myofascial trigger points.

## Methodology

In this comparative interventional study, a total of 30 subjects were randomized into two groups in ratio 1:1 by coin toss method. Patients having MTrPs of upper trapezius with age between 20 to 40 years, and the individuals with a known history of fibromyalgia syndrome (tender points do not trigger points), whiplash injury, cervical spine surgery and fracture, and cervical radiculopathy were included in the study. Ethical approval of the study was obtained from Sheikh Zayed Hospital and Al Khidmat Medical Complex, Rahim Yar Khan and written informed consent was obtained from each patient.

In Group A (Dry Needling), DN for MTrPs was executed through 'solid filiform needles' (50×3 mm). In this group the patient were asked to lie down in a prone position. The subject's overlying skin was washed with water. The needle was inserted in the muscle and moved forward and backward to cause a weak muscle twitch called the

LTR. The needling was stopped after causing the LTR. If no twitch was perceived, the needle was taken out after two to three stellate motions.

In Group B (Dry Cupping), suction cup size 3 (diameter 4.3 cm) was applied with a manual suction gun with moderate pressure on a trigger point. Suction remains applied for 5 minutes, after which the cup was removed (Table 1).

NPRS (Numeric Pain Rating Scale), goniometer (Cervical ROMs), and NDI (Neck Disability Index) scales were used in this study before the intervention and after completion of three sessions on alternate days in one week. For the data collection, patients with neck pain coming to OPD were assessed for a trigger point in the upper trapezius, the exact location of MTrP was palpated. Investigators searched for nodules (small or large) or lumps (one or more of them next to each other) in the muscles/fascia. In addition, investigators looked for a temperature change in the active MTrP zone (skin warmer or cooler).

Three steps were followed for confirmation of trigger point:

1. The initial onset of pain and recurrence of pain of muscular origin,
2. Reproducible spot tenderness arising in the muscle at the trigger pain point site, and
3. Pain reproduced locally or externally through mechanical manipulation of the trigger point.

**Table 1: Intervention details of both groups.**

	<b>Group A (Dry needling)</b>	<b>Group B (Dry cupping)</b>
<b>Frequency</b>	Total three treatment sessions on alternate days, over one week.	Total three treatment sessions on alternate days, over one week.
<b>Intensity</b>	solid filiform needles (50 × 3 mm)	Size 3cup ē medium suction intensity
<b>Time</b>	The session will end after the needle doesn't show a stellate movement	The session will end after 5 minutes of medium suction
<b>Type</b>	Dry needling	Dry cupping

For myofascial trigger points (MTrPs), the needle was inserted using a tapping movement. The needle was placed in the muscle and rotated forward and backward to elicit a small muscle twitch called the LTR. The needle was stopped after the LTR had been activated. If no twitch was caused, the needle was stopped after two to three stellate movements.

Dry needling of trigger-point is an invasive procedure in which a fine needle or acupuncture needle is inserted into the skin and muscle. It is intended for myofascial trigger points (MTrP) that are hyperirritable spots in the skeletal muscle in the taut band palpable as a hypersensitive visible nodule. Dry needling at the trigger point can be performed at a superficial or deep tissue level.

Dry cupping involves the creation of a vacuum under the cup, and soft tissue is distracted. This results in increased circulation to the skin. This is immediately followed by the redness produced underneath the cups.

Data was entered and was analyzed on SPSS software version 20. Statistical significance was set as  $p = 0.05$ . For descriptive data, frequency tables, pie charts, descriptive statistics were expressed as measurements results measured over time. An independent sample t-test was used to measure

the association between two groups, and paired sample t-test was used to measure the association between successive visits within the group.

## Results

Out of the total 30 patients, 20 were male (66.7%) and 10 were female (33.3%). Furthermore, 13.33% were students, 26.67% had a desk job, and 26.67% of the female participants were housewives. Literacy data revealed 16.67% were illiterate, 20% had primary education, 10% had higher secondary education, 10% were graduates, 10% had their master's degree completed, and 3.33% were doctors.

### Within group comparison

The pre-intervention NPRS score of the group-A (Dry Needling) participants was  $7.13 \pm 1.64$ , while the post-intervention score was  $2.00 \pm 1.46$ , which is showing a highly significant improvement in NPRS score ( $p < 0.05$ ). The pre-intervention NDI score of the group-A participants was  $6.13 \pm 4.32$ , while the post-intervention score was  $33.13 \pm 8.84$ , which is showing a highly significant improvement in the NDI score ( $p < 0.05$ ). The results show that dry needling was effective in reducing the pain and disability of the cervical spine, and it improved all the ranges of cervical spine motion (Table 2).

**Table 2: Within-group comparison of Group-A participants (Dry Needling).**

Variable	Pre-Intervention	Post-Intervention	p-value
	Mean $\pm$ SD		
<b>NPRS</b>	7.13 $\pm$ 1.64	2.00 $\pm$ 1.46	0.001
<b>NDI</b>	6.13 $\pm$ 4.32	33.13 $\pm$ 8.84	0.001
<b>Cervical Flexion</b>	42.80 $\pm$ 4.76	57.33 $\pm$ 6.47	0.001
<b>Cervical Extension</b>	46.20 $\pm$ 4.91	66.80 $\pm$ 4.60	0.001
<b>C. lateral Flexion (Rt.)</b>	23.53 $\pm$ 2.47	37.93 $\pm$ 2.52	0.001
<b>C. lateral Flexion (Lt.)</b>	27.13 $\pm$ 3.70	39.27 $\pm$ 3.65	0.001
<b>C. Rotation (Rt.)</b>	49.20 $\pm$ 4.07	81.87 $\pm$ 4.74	0.001
<b>C. Rotation (Lt.)</b>	47.53 $\pm$ 3.98	83.33 $\pm$ 4.32	0.001

The pre-intervention NPRS score of the Group-B participants was  $6.80 \pm 2.04$ , while the post-intervention score was  $2.00 \pm 1.46$ , which is showing a highly significant improvement in NPRS score ( $p < 0.05$ ). The pre-intervention NDI score of the Group-B participants was  $4.87 \pm 3.81$ , while the post-intervention score was  $29.73 \pm 11.06$ , which is showing a highly significant improvement in the NDI score ( $p < 0.05$ ). The results of Group-B

participants also show that dry cupping was also effective in reducing the pain and disability of the cervical spine, and it also resulted in the improvement of all the ranges of cervical spine motion (Table 3).

**Table 3: Within-group comparison of Experimental Group-B participants (Dry Cupping)**

Variable	Pre-Intervention	Post-Intervention	p-value
	Mean±SD		
<b>NPRS</b>	6.80±2.04	2.00±1.46	0.001
<b>NDI</b>	4.87±3.81	29.73±11.06	0.001
<b>Cervical Flexion</b>	42.93±5.35	59.00±5.60	0.001
<b>Cervical Extension</b>	47.00±5.12	68.20±4.00	0.001
<b>C. lateral Flexion (Rt.)</b>	27.40±3.26	39.33±3.86	0.001
<b>C. lateral Flexion (Lt.)</b>	27.67±4.30	39.67±4.51	0.001
<b>C. Rotation (Rt.)</b>	47.07±4.80	80.33±3.77	0.001
<b>C. Rotation (Lt.)</b>	47.13±5.055	81.33±3.81	0.001

### Between group comparison

There was no significant difference between the effectiveness of both techniques for reducing pain and disability of the cervical spine and no significant difference in improving the ranges of cervical spine motion (Table 4).

**Table 4: Between group comparison of study participants.**

Variable	Group-A	Group-B	p-value
	Mean±SD		
<b>NPRS</b>	2.00±1.46	2.00±1.46	0.990
<b>NDI</b>	33.13±8.84	29.73±11.06	0.359
<b>Cervical Flexion</b>	57.33±6.47	59.00±5.60	0.457
<b>Cervical Extension</b>	66.80±4.60	68.20±4.00	0.382
<b>C. lateral Flexion (Rt.)</b>	37.93±2.52	39.33±3.86	0.250
<b>C. lateral Flexion (Lt.)</b>	39.27±3.65	39.67±4.51	0.792
<b>C. Rotation (Rt.)</b>	81.87±4.74	80.33±3.77	0.336
<b>C. Rotation (Lt.)</b>	83.33±4.32	81.33±3.81	0.242

## Discussion

Both these treatment techniques are efficient in resolving myofascial trigger points. As previously, dry needling was believed to be more effective to the ischemic pressure method. Now dry cupping has emerged as an alternative medicine approach to handle it effectively. This study shows no significant difference exists between the groups, i.e., either dry needling or dry cupping. However, the NDI score for group A participants receiving Dry needling for the upper trapezius shows a positive result. It indicates that dry needling can be a better treatment option for cervical pain, limiting

the neck's physiological or biomechanical movements.

Similarly, while considering the range of motion of the neck region, group B participants showed an increase with a p-value < 0.05. NPRS score was insignificant during 'between' group analysis. It now suggests that dry needling improves the biomechanical control of the cervical region and spine, but dry cupping improves the range of motion of the spine. It should be considered that both treatment options can be utilized on single patient for better ROM and NDI scoring.

A study was conducted in 2016 which compared the effect of instrument-assisted soft tissue mobilization technique along with dry cupping and ischemic pressure. It was found that dry cupping and ischemic pressure had the same significance in resolving myofascial trigger points<sup>16</sup>. Similarly, in 2016 Corezeo et al. studied the efficacy of dry needling for nonspecific neck pain of chronic type<sup>17</sup>. It was a single-blinded, randomized clinical trial. Dry needling and passive stretching have been concluded to be more effective than passive stretching alone in people with unspecific neck pain. In 2017, Elsdon et al. studied the efficacy of dry needling and found that it was effective in the treatment of trapezium trigger and neck pain<sup>18</sup>.

A previous systematic review (meta-analysis) suggested that dry needling when compared to placebo, could reduce pain right after the treatment session and in four weeks for myofascial pain participants. Nonetheless, the number of high-quality randomized controlled trials (RCTs) was small. There was no evidence for the long-term effectiveness of dry needling for myofascial pain syndrome correlated with neck and shoulder pain in this meta-analysis; thus, significant, multi-term RCTs are needed to support this recommendation<sup>19</sup>. However, high-quality RCTs were small, and there was no evidence for the long-term efficacy of dry needling for myofascial pain syndrome correlated with shoulder pain and neck pain in this meta-analysis; therefore, significant multi-term RCTs were needed to support this recommendation.

Cagnie et al. did a systemic review to explore evidence of the use of ischemic compression and dry needling. They treated upper trapezius trigger points in patients with neck pain and concluded that dry needling produced a strong effect on pain reduction similar to our study<sup>20</sup>. Though, Elizabeth et al., in their systematic review, concluded that needling is a better option to control pain as compared to placebo, therefore, confirming the results of our study that dry needling is an effective approach. However, there is still a need for a large sample adequately powered placebo-controlled study to confirm the results<sup>21</sup>. Baldry compared the

effects of superficial versus deep dry needling and concluded that deep dry needling significantly affected the cervical range of motion and neck disability. The current study also used deep dry needling and had a significant effect on pain and NDI<sup>22</sup>.

The effects of dry needling on pain pressure threshold, discomfort, and weakness in patients with trigger points located in the upper trapezium muscle were observed in many studies. In agreement with our study, they reported a noteworthy improvement in the pain and pain pressure threshold in both their groups, i.e., dry needling and traditional physical therapy. However, there was a significant decrease in pain<sup>23</sup>. Dry needling in office workers for trapezius muscle trigger points causing neck pain. They found that dry needling and stretching reduce the pain for a short duration compared to passive stretching alone<sup>24</sup>. This confirms the results of our study that dry needling relieves the pain of trigger points. Active trigger points of the upper trapezius reduced the irritability of the motor endplate<sup>25</sup>. While in our study, we also expect that reduced pain is due to reduced irritability of motor endplate and decreased activity of sympathetic nervous system. Lauche et al. conducted a study in 2012, they reported that there was no difference in pain pressure threshold, visual analog scale, and neck disability index between the cupping group and the control group at the 12th week<sup>26</sup>. In our study, we studied the difference after one week, which showed no significant difference between groups even at one week.

This article shows that measurement error, recall bias, and sample size were not calculated in the previous studies. There is no work with the same design and minimum detectable difference, so the limitations of this research are calculation error, recall bias, and sample sizing. This article will compare both the treatment methods and suggest a better option for physical therapists and other healthcare professionals in resolving myofascial trigger points and subsequently trapezius muscle pain, which causes neck, shoulder, and upper back pain. After experiments and social interaction, our

recommendation is: due to the higher cost and time required for dry cupping, dry needling should be preferred in clinical practice.

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## Conclusion

Pre-and post-intervention results concluded that both treatment methods are effective for the treatment of myofascial trigger points. There was no significant difference between the two groups for the numerical pain rating scale, the neck disability index, and the cervical ROMs. Besides, dry needling and dry cupping are equally effective in relieving upper trapezius trigger points and can be used as an alternative approach to medicines.

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## Conflicts of Interest

The authors have declared that no competing interests exist.

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