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## Effects of Myofascial Release versus Strain Counterstrain on Mechanical Neck Pain and Range of Motion

Muhammad Waqar Younas<sup>1\*</sup>, Maham Gull<sup>2</sup>, Esha Dilawar<sup>1</sup>, Muhammad Umar Mehboob<sup>1</sup>, Soban Muhammad Akram<sup>1</sup> Usman Tahir<sup>1</sup>

<sup>1\*</sup>Department of Rehabilitation Sciences, The University of Faisalabad, Faisalabad, Pakistan <sup>2</sup>Jafar Physiotherapy Clinic, Faisalabad, Pakistan

### KEYWORDS

Myofascial release  
Neck pain  
Range of motion  
Strain counterstrain

### DECLARATIONS

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### CORRESPONDING AUTHOR

Muhammad Waqar Younas  
Department of  
Rehabilitation Sciences, The  
University of Faisalabad,  
Faisalabad, Pakistan  
[waqaryounas.dpt@tuf.edu.pk](mailto:waqaryounas.dpt@tuf.edu.pk)

### ABSTRACT

**Background:** Neck pain is an issue that most people can be affected by and it should be treated once in life, although the majority will not find it to interfere with their activities. The researchers found that neck pain of unspecified duration occurred in at least 80% of the population. **Objective:** To find the effects of myofascial release on neck pain and range of motion and compare it with strain counterstrain therapy. **Methodology:** This quasi-experimental trial was conducted at the outpatient department of physical therapy, Allied Hospital, Faisalabad, and Riphah University, Faisalabad, over six months from July to December 2023. About 50 patients were assessed for eligibility, out of which 44 met the inclusion criteria and were randomly allocated into two equal groups using a lottery method. Participants were males and females aged 30 to 50 years diagnosed with mechanical neck pain localized between the superior nuchal line and the first thoracic spinous process. Patients with recent cervical spine surgery, neurological disorders, active infections, or fibromyalgia syndrome were excluded. Group A received myofascial release therapy while Group B was provided with strain counterstrain treatment. Outcome measures included the Numeric Pain Rating Scale, Neck Disability Index, and active cervical range of motion using an inclinometer. Normality was assessed using the Shapiro-Wilk test. Independent sample t-tests were applied for between-group comparisons of NPRS and NDI scores in MFR and SCS groups and repeated measures ANOVA was used to analyze within-group differences. **Results:** Both myofascial release and strain counterstrain techniques are beneficial for patients with mechanical neck pain. However myofascial release shows more significant results than the strain counterstrain. Pain score shows a significant reduction within both groups across the three-week intervention period ( $p < 0.05$ ), with the myofascial release group improving from a mean of 7.68 to 2.5 and strain counterstrain group from 7.68 to 2.22. However, there were no statistically significant differences between the two groups across most outcome measures, suggesting that both treatments are comparably effective. **Conclusion:** It concluded that myofascial release and strain counterstrain were proven effective in decreasing pain and improving range of motion in patients with mechanical neck pain.

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## INTRODUCTION

A serious problem, neck pain, exists in most of our general population. Although the majority will not find it to interfere with their activities, certain people are affected and should be treated once in their lives.<sup>1</sup> Neck pain can originate from different sources like bones, discs, ligaments, joints, muscles, and fascia. These are all innervated by pain fibers (nociceptors). There is not a single cause for neck pain, but a combination of factors that cause it, with pain being the most common symptom of these factors.<sup>2</sup> Neck pain is multifactorial in etiology, with numerous risk factors. There are some non-modifiable risk factors, including gender, genetics, and aging. Cervical osteoarthritis, degenerative disc disease, and stenosis of foramina at the cervical level cause excessive friction, rupture, and narrowing of the space that pinches the nerves exiting respectively.<sup>3</sup>

According to recent studies, on average, 10% of the Canadian population reported having neck pain for one week every month. The researchers also found that neck pain of unspecified duration occurred in at least 80% of the population. Some researchers conducted an epidemiological study and revealed that neck pain for longer than 6 months had a 54.2% incidence. This was lower than in Finland, Norway, and Sweden where an incidence of 72% was found. In America, a survey on a 01-year percentage of cervical pain ranged from 12.1 to 71.5% in unemployed people, and for workers it ranged from 27.1 to 47.8%. A study confirms that about gender, 5% of males and 18% of females had work-related neck pain. A huge community of physical therapists is also affected by neck pain; the reason for neck pain among physical therapists may be due to providing long treatment sessions to patients. According to a study, more than 18% prevalence of neck pain is there among physiotherapists.<sup>4</sup>

Dental health professionals have a higher incidence of work-related musculoskeletal disorders in comparison with other health professionals. The prevalence of pain in the L4-L5 region is found to be higher than in other bodily sites, which show musculoskeletal symptoms, which is 62%. The prevalence of neck pain among dentists is 74.3%.<sup>5</sup> According to a researcher, the higher prevalence of neck pain in dentists is due to the frequent assumption of constant static posture, which requires more than 50% of the

body's muscles to contract to hold the body in a steady position while resisting gravity during the job.<sup>5</sup> A large percentage of adults suffer from neck pain. In a six-month study, 4.7% experienced functional limitations of daily activities because of neck pain. The percentage of cervical pain increases with age and is more common in females than males. Some researchers reported that 43% of females and 30% of males were the victims of neck pain at some time throughout their lives.

A retrospective study was done by a researcher at the Chiropractic Day Clinic to establish the prevalence and demographics of neck pain. From 1996 to 2005, there was a prominent increase in the prevalence of neck complaints presented to the teaching clinic, from 17.4 to 20.61%.<sup>6</sup> As above, neck pain is not due to just any one reason; it is multifactorial in origin, so different mechanisms of causes lead to different types of pain. The very common types of neck pain include referred pain, radicular pain, chronic neck pain, and mechanical neck pain. Pain that is characterized by symptoms such as headaches, and pain in the arms or shoulders is termed as referred neck pain.<sup>7</sup> Pain that arises due to problems in nerves, intervertebral disc, and spinal cord presents symptoms such as tingling, weakness, numbness, etc., and is characterized as radicular pain. Many studies have proved the positive effects of physical therapy in reducing neck pain but some research has denied the role in reducing neck pain.

The general neck exercise regimen is also used as a treatment strategy to treat neck pain in clinical practice but no evidence behind it. Another type of neck pain is mechanical pain. Any activity or movement (lifting, twisting activities, bending, and poor posture) that puts the body, especially the neck, under stress or strain is termed mechanical.<sup>7</sup> Maintaining good posture, following guidelines relevant to ergonomics, taking frequent breaks while exercising and carefully managing load lifting can help prevent neck and back pain.<sup>8</sup> Besides these guidelines, there are various other guidelines and physical therapy techniques to relieve pain and enhance range of motion. Techniques used in common practice include strength training, myofascial release, endurance training strain counter strain, etc. Myofascial release (MFR) and strain counterstrain (SCS) are two techniques to consider here. Nowadays, myofascial release therapy is being widely used

for the treatment of neck pain, this technique also helps in improving the range of motion (ROM) at the neck.

Any restrictions in muscle and surrounding soft tissue are removed by applying continuous pressure at a specific point and it is better to perform it without the use of any oils or lubricants.<sup>9</sup> Any tight or painful area is identified first, which enhances a feeling of tightness, stiffness, and elasticity is treated.<sup>10</sup> The purpose of the technique is to loosen and relax the area (musculature) by the application of stretching and manual pressure. The trigger point and MFR technique are both helpful in coping with pain and tightness. According to some authors, both these techniques are the same (trigger point therapy is sometimes referred to as a type of MFR), however, there are some differences in these techniques.<sup>10</sup> Based on the application of MR therapy, is divided into two parts. First, therapists do not perform techniques themselves, the patient is guided by the therapist to perform contractions and relaxations of muscles, which is called active MFR.<sup>10</sup>

The SCS also known as 'positional release', is also an effective treatment method to handle neck pain and increase the range at the neck. In this technique, the therapist passively puts the patient in a position of comfort or ease (where there is minimal pain) that shortens the painful musculature.<sup>11</sup> The shortened position is maintained/ held for about 90 seconds; doing this can interrupt reflexes by reducing muscle tone.<sup>12</sup> Conditions such as osteoporosis, postoperative pain, torticollis, pregnancy, or pelvic pain are positively treated by SCS.<sup>11</sup> These techniques are very gentle, which makes them useful in treating almost every patient with musculoskeletal disorders. In modern days, a relaxed lifestyle is a part of normal routine and at workplaces, there is a very high dependence on laptops and computers is predicted that the percentage of chronic neck pain patients will be higher in the future. Proper treatment of neck pain is very important to prevent neck disabilities and to control absences from duty. The purpose of this study was to find the effects of MFR on neck pain and ROM and compare it with the effectiveness of SCS.

## METHODOLOGY

This quasi-experimental trial was conducted at the outpatient department of physical therapy,

Allied Hospital, Faisalabad, and Riphah University, Faisalabad, over six months from July to December 2023. A total of 50 patients were assessed for eligibility, out of which 44 met the inclusion criteria and were randomly allocated into two equal groups using a lottery method. The sample size was calculated based on the difference between means from a previous study using a 95% confidence level and 80% power, resulting in 22 participants per group. Eligible participants were males and females aged 30 to 50 years diagnosed with mechanical neck pain localized between the superior nuchal line and the first thoracic spinous process.

Patients with recent cervical spine surgery, neurological disorders, active infections, or fibromyalgia syndrome were excluded. Group A received MR therapy. Hot packs were applied 10 minutes before treatment, and then myofascial release therapy, also sometimes known as trigger point therapy, was provided. In Group B, after applying hot packs, this group was provided with SCS treatment. In this treatment shortened position is maintained for up to 90 seconds. This technique is also known as positional release. Both groups underwent six treatment sessions (two per week) over three weeks. Assessments were conducted at baseline and after each treatment week.

Outcome measures included the Numeric Pain Rating Scale (NPRS), Neck Disability Index (NDI), and active cervical range of motion (CROM), which was measured using an inclinometer in all directions (flexion, extension, lateral flexion, and rotation). Pain and disability were assessed using the NPRS and NDI questionnaires. Data analysis was conducted using SPSS. Normality was assessed using the Shapiro-Wilk test. Independent sample t-tests were applied for between-group comparisons of NPRS and NDI scores in MFR and SCS groups and repeated measures ANOVA was used to analyze within-group differences. A p-value of less than 0.05 was considered statistically significant.

## RESULTS

The study compared two manual therapy techniques MFR and SCS for their effectiveness on mechanical neck pain and CROM over three weeks. A total of 44 patients were randomly assigned to Group A (MFR) or Group B (SCS), with treatment given over 6 sessions. The mean age in

Group A was 35.6 years, and in Group B, it was 40.9 years. Both groups were comparable in terms of gender distribution, height, weight, and BMI. Pain intensity, as measured by NPRS, showed significant reduction within both groups across the three-week intervention period ( $p < 0.05$ ), with Group A improving from a mean of 7.68 to 2.5 and Group B from 7.68 to 2.22. However, there were no statistically significant differences between the two groups across most outcome measures, suggesting that both treatments are comparably effective.

NDI scores also showed significant intra-group improvement ( $p < 0.05$ ), decreasing from 29.90 to 9.18 in Group A and from 32.68 to 10.04 in Group B. While baseline NDI scores differed significantly between the groups ( $p = 0.03$ ), post-treatment scores were not significantly different, as mentioned in Table 1. All measured directions of the cervical range of motion showed statistically significant improvements within each group ( $p < 0.05$ ). For example, cervical flexion improved from  $49.95^\circ$  to  $69.22^\circ$  in Group A and from  $46.68^\circ$  to  $67.72^\circ$  in Group B. Extension, side flexion (right and left), and rotation (right and left) followed the same trend. Table 2 explains that no statistically significant differences were noted between the two groups in any ROM direction at any assessment point.

## DISCUSSION

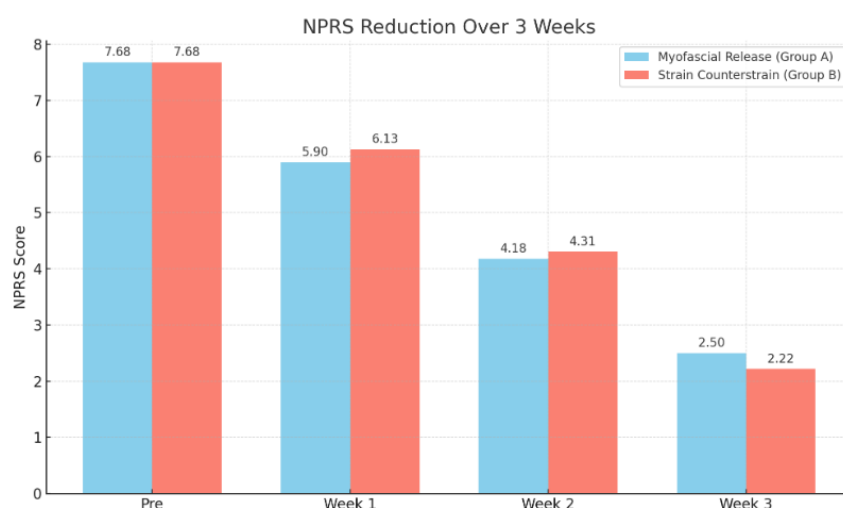
The research intended to evaluate the effects of MFR and SCS on mechanical neck pain. To prove the effects of MFR and SCS in mechanical neck pain, this quasi-experimental clinical trial was conducted based on 3 weeks, and 44 individuals

were included in this study. Previous studies have explored various treatment approaches for neck pain; direct comparisons between MFR and SCS remain limited. This study contributes to the growing body of evidence supporting the clinical utility of both techniques in rehabilitation settings.

Pre-treatment assessment was done before treatment, and then at the end of the 1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup> week of treatment, again assessment was done by using NDI and NPRS and measuring cervical ROM. The mean scores of all tools of measurements NDI, NPRS, and CROM were analyzed after collecting the data of both groups, and improvements in assessment and values of all three tools suggested that both treatments are effective in managing pain and increasing range of motion but if we consider mean score among two groups we will find that myofascial release group was very slightly more effective (almost negligible) than strain counter strain group. Significant differences in the initial values or at the end of follow-up were found in both experimental groups.

Many studies have been conducted before by many researchers to compare the effectiveness of different strategies but a comparison between these two techniques is under consideration and is not fully explored. Various studies support the effectiveness of both treatments and there is also a vast literature available that does not favor the efficacy of either of the two treatments. An experimental study comprising two groups, control and experimental, recruited 40 subjects in total and was conducted by Gauns SV, Gurudut PV. The control group was provided with treatment

**Figure 1: Pain level among both groups**



**Table 1: Within-group comparison of NPRS and NDI scores in myofascial release and strain counterstrain groups**

| Outcome Measures | Follow-ups      | Group A: Myofascial Release | Group B: Strain Counterstrain |
|------------------|-----------------|-----------------------------|-------------------------------|
| NPRS             | Pre-treatment   | 7.68±1.75                   | 7.68±2.05                     |
|                  | Week 1          | 5.90±1.84                   | 6.13±1.83                     |
|                  | Week 2          | 4.18±1.91                   | 4.31±1.52                     |
|                  | Week 3          | 2.50±1.79                   | 2.22±1.63                     |
|                  | Mean Difference | 5.182                       | 5.455                         |
|                  | p-value         | <0.001                      | <0.001                        |
| NDI              | Pre-treatment   | 29.90±6.65                  | 32.68±10.04                   |
|                  | Week 1          | 23.72±7.67                  | 24.36±7.20                    |
|                  | Week 2          | 16.59±7.22                  | 18.45±6.39                    |
|                  | Week 3          | 9.18±6.28                   | 10.04±5.57                    |
|                  | Mean Difference | 20.72                       | 22.36                         |
|                  | p-value         | <0.001                      | <0.001                        |

**Table 2: Between-group comparison of range of motion of myofascial release and strain counterstrain groups**

| Outcome Measures      | Follow-ups    | Group A: Myofascial Release | Group B: Strain Counterstrain |
|-----------------------|---------------|-----------------------------|-------------------------------|
| Side Flexion Left (°) | Pre-treatment | 31.36±3.20                  | 30.86±3.97                    |
|                       | Week 1        | 36.40±3.56                  | 36.36±3.45                    |
|                       | Week 2        | 40.09±3.47                  | 40.45±2.34                    |
|                       | Week 3        | 42.68±2.66                  | 43.27±1.69                    |
| Rotation Right (°)    | Pre-treatment | 57.18±9.38                  | 59.54±8.25                    |
|                       | Week 1        | 63.86±8.85                  | 66.45±6.68                    |
|                       | Week 2        | 71.36±7.53                  | 73.22±6.45                    |
|                       | Week 3        | 78.50±6.54                  | 80.63±6.32                    |
| Rotation Left (°)     | Pre-treatment | 56.90±9.59                  | 59.31±8.63                    |
|                       | Week 1        | 64.18±9.12                  | 63.36±14.58                   |
|                       | Week 2        | 71.36±7.18                  | 72.72±6.52                    |
|                       | Week 3        | 78.54±6.70                  | 79.90±6.13                    |

of hot packs, TENS, stretching, and strengthening exercises; the experimental group was treated using MFR therapy of the neck and upper limb treatment lasted for six days. The outcome was measured with the Northwick Park questionnaire and ranges for cervical measurements were taken with a goniometer. The study showed that MFR of the neck and upper limb is an effective technique in patients with mechanical neck pain.<sup>13</sup> Results of showed that both groups proved equally effective. A therapist conducted a study on the MFR technique on patients having lumbar and cervical

problems. Participants were categorized into two groups randomly. Group 1 received MFR therapy; on the other hand, Group 2 received placebo treatment the participants did not know about being treated placebo. Treatment was provided for six weeks and then the level of pain and range of motion were measured. Results showed that Group 1 (MFR therapy) had increased results compared to Group 2.<sup>10</sup> Both groups proved equally effective in minimizing pain and increasing ROM. A researcher performed a randomized parallel-group study on patients with

mechanical neck pain. Two groups were formed and a total of 51 participants were randomly allocated to these two groups. One group received MFR therapy as treatment, while the other group was provided with simple manual therapy as a treatment protocol. The treatment was aimed at treating pain, improving the ROM at the neck, and improving quality of life. Results showed that the group that received MFR therapy was better as compared to the other. It is then concluded that myofascial release is a more effective and efficient treatment to treat neck pain.<sup>14</sup> The results of a recent study showed that both groups proved equally effective in minimizing pain and increasing ROM.

A pilot study, which is a randomized controlled trial pilot study was performed by Mustafa Ali Akcetin and colleagues to determine the effectiveness of three treatments or techniques. The study involved a total of 48 patients who were randomly equally allocated to three groups; Group A received MFR, Group B SCS, and Group C integrated neuromuscular inhibition technique). Results showed that SCS and inhibition techniques proved effective in managing pain compared to MFR.<sup>15</sup> Whereas results of a recent study showed that both groups proved equally effective in minimizing pain and increasing ROM.<sup>14</sup>

A study conducted by O'Connell SM and Co. showed that SCS has very beneficial effects in dealing with patients with limited CROM and pain. They applied SCS on one Group, having randomly allocated subjects, and applied a sham treatment to the other group. Results showed that there were no harmful effects of sham treatment, however, there was an impressive improvement among subjects of the strain counter-strain group.<sup>16</sup> Results of a recent study showed that both groups proved equally effective in minimizing pain and increasing range of motion. Reinhold Klein and colleagues conducted a study that included 61 patients having neck pain. Two groups were made based on treatment. Group 1 received SCS treatment, whereas the other group received sham treatment, which aimed to provide relief from neck pain and increase ROM. Both groups showed improvement in mobility (2% in the strain counter strain group and only 0.6% in the sham treatment group).<sup>3, 17</sup> No doubt, there is an improvement, but it is concluded that strain counter-strain alone is not enough to deal with pain in the neck; a combination of techniques is

required to treat pain and any restrictions. Results of a recent study showed that both groups proved equally effective in minimizing pain and increasing range of motion.

## CONCLUSION

The study concluded that myofascial release and strain counterstrain were proven effective in reducing mechanical neck pain and increasing range of motion. However myofascial release shows more significant results than the strain counterstrain. Pain score shows a significant reduction within both groups across the three-week intervention period ( $p < 0.05$ ). There were no statistically significant differences between the two groups across most outcome measures, suggesting that both treatments are comparably effective.

## DECLARATIONS

**Consent to participate:** Written consent had been obtained from patients. All methods were performed following the relevant guidelines and regulations.

**Availability of data and materials:** Data will be available on request. The corresponding author will submit all dataset files.

**Competing interests:** None

**Funding:** No funding source is involved.

**Authors' contributions:** All authors read and approved the final manuscript.

**CONSORT Guidelines:** All methods were performed following the relevant guidelines and regulations.

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