

Effectiveness of Lower Cervical Manual Traction versus Dry Needling Along With Soft Tissue Mobilization for Management of Unilateral Cervical Radiculopathy

Dr. Viveka Kumari

Physiotherapist
Neelkant Mother Care Hospital

Dr. Muhammad Amir

Senior Physiotherapist
Jinnah Postgraduate Medical Center

Dr. Rida Wahid

Clinical Physiotherapist
Raja Medical and Surgical Center, Kunri

Dr. Bisma Khan

Lecturer
Shaaf Institute of Medical and Modern Sciences, Larkana

Dr. Syed Saif ul Haq

Senior Lecturer
Taqwa Institute of Physiotherapy & Health Sciences

Corresponding Author

Dr. Syed Saif ul Haq

Senior Lecturer
Taqwa institute of Physiotherapy and Health Sciences

ABSTRACT

Back ground: Cervical Radiculopathy (CR) is one of the most common causes of neck pain and disability. The reported annual incidence and prevalence of CR are 0.83% and 3.5% respective. Cervical radiculopathy is a dysfunction of a nerve root in the cervical spine, is a broad disorder with several mechanism.

Objective: To determine the effectiveness of lower cervical manual traction verses dry needling along with soft tissue mobilization for management of unilateral cervical radiculopathy.

Study setting: Study was conducted in physiotherapy OPD JPMC hospital Karachi.

Subject and Method: An experimental study that compared pre and post intervention result within group and across group 40 patients suffering from cervical radiculopathy that were equally divided into group A and group B group A receive dry needling group B manual traction along with soft tissue mobilization. Neck pain was assessed with visual analogue scale (VAS), severity of CR was assessed with (GROC) and neck disability was assessed through neck disability index (NDI).

Results: After four weeks of intervention in both groups, the same parameters were re-assessed for any significant difference. Patients in group A, who received dry needling technique had reduction in VAS with mean 2.15 (± 0.98), increase in GROC with mean 5.05 (± 1.14) and reduction in NDI with mean 20.5 (± 4.84). Patients in group B who received manual traction had also reduction in VAS with mean 3.40 (± 0.99), increase in GROC with mean 4.25 (± 1.40) and reduction in NDI with mean 26.20 (± 5.94).

Conclusion: Our research findings dry needling technique proved to have better outcomes of reduction in pain and neck disability compared to manual traction in cervical radiculopathy.

Keywords: Cervical radiculopathy, dry needling, Manual traction, Soft tissue mobilization.

INTRODUCTION

Cervical Radiculopathy (CR) is one of the most common causes of neck pain and disability.¹ The reported annual incidence and prevalence of CR are 0.83‰ and 3.5‰ respectively.² cervical radiculopathy is a dysfunction of a nerve root in the cervical spine, is a broad disorder with several mechanisms of pathology and it can affect people of any age³ with peak prominence between the ages of 40-50 reported prevalence is 83 people per 100,000 people.^{4,5} Annual incidence has been reported to be 107,3 per 100.000 for men and 63,5 per 100.000 for women.^{6,7,8} Literature Cervical radiculopathy, commonly called a "pinched nerve," occurs when a nerve in the neck is compressed or irritated where it branches away from the spinal cord. This may cause pain that radiates into the

shoulder and/or arm, as well as muscle weakness and numbness and alter reflex^{9,10}. Evidence suggest that Cervical radiculopathy is frequently caused by "wear and tear" changes in the spine, such as arthritis which is age related changes occur.^{8,11,12} A sudden injury that results in a herniated disc is the most common cause in younger people¹³. However, in certain circumstances, the emergence of symptoms is Pins-and-needles tingling and/or discomfort can radiate down into the arm and/or hand, ranging from achy to shock-like or burning compression caused by Neck and radiating arm pain or numbness, sensory impairments, or motor dysfunction in the neck and upper extremities are all common symptoms of impingement.^{13,14,15,16} Lifting heavy objects, regular diving from a board, driving vibrating machinery, and playing golf are some of the other risk factors that have been proposed in CR.¹⁷ The human body possesses eight cervical nerve roots, one for each of the seven cervical vertebrae, which can be confounding at first. However, between C7 and T1, a nerve root emerges from the spinal column, resulting in C8, as T1 already exists.¹⁸ Another study suggested studied the cervical intervertebral foramina, nerve narrowest section, formed like a funnel Nerve compression caused by herniated disc material or arthritic bony spurs is known as cervical radiculopathy.¹⁹ Neck and radiating arm pain or numbness, sensory impairments, or motor dysfunction in the neck and upper extremities are all common symptoms of impingement."²⁰Pathologies that induce symptoms on the nerve roots cause cervical radiculopathy Compression, irritation, traction, and a lesion on the nerve root can all be produced by a herniated disc, foramina constriction, or degenerative spondylitis change (Osteoarthritic change or degeneration) that leads to stenosis of the intervertebral foramen²¹.Most cases of cervical radiculopathy are unilateral; however, if substantial bone spurs are present at one level, impinging/irrigating the nerve root on both sides, bilateral symptoms may occur[Literature suggested that the irradiating arm pain according to a dermatome pattern, neck discomfort, parenthesis, muscle weakness in a myotomal pattern, reflex impairment/loss, headaches, scapular pain, sensory and motor dysfunction in the upper limbs and neck are all signs of cervical radiculopathy.^{22,23,24}Different symptoms are caused by radiculopathy at different levels of the spine Radiculopathy . C5 radiculopathy causes pain in the upper arms and shoulder blades, however it rarely causes numbness or tingling.C6 Radiculopathy²⁵ Patients with C6 radiculopathy may have pain or weakness in their arms, including their biceps, wrists, thumbs, and index fingers. C7 radiculopathyis

the most common type, with discomfort or weakness extending from the neck to the hand, encompassing the triceps and middle finger C7 radiculopathy is the most common type, with discomfort or weakness extending from the neck to the hand, encompassing the triceps and middle finger. Radiculopathy at the C8 level is similar to radiculopathy at the C7 level.^{25,26} Radiographs, MRI, and electrophysiological examinations (EMG + Nerve Conduction Studies) to investigate the nerve root and nerve conduction velocity are the most common diagnostic procedures used to determine the existence of probable compression. Root compression detected on an MRI may indicate cervical radiculopathy, but spiral CT is described as the best approach to detect foramina stenosis, which causes a bone compression on the nerve.²⁷ Researches suggested that Cervical radiculopathy can be treated with a variety of approaches, the most popular of which include physical therapy and surgery. However, the long-term advantages of surgical procedures are debatable, with 25% of patient's still experiencing pain and disability after a year. There is substantial evidence to support the use of physical therapy interventions²⁸, as well as the benefits of physical therapy and manual techniques in general for individuals with neck discomfort and radicular symptoms.

METHODOLOGY

Study Design

Randomized Controlled Trial.

Sample Technique

Envelope method of simple random sampling technique.

Sample Description

Patients who were treated for CR in physiotherapy OPD of JPMC hospital in Karachi. Patients had understood the purpose of the study, and voluntarily signed the consent form prior to the experiment all subjects received the full explanation of the experiment and provided voluntary consent. In this study twenty subjects were randomly selected and assigned in two Experimental groups Group A was depend on Dry Needling along with Soft tissue mobilization and group B was depend on lower cervical manual

traction along with soft tissue mobilization. Twenty subject were assign in group A and remaining subjects were assign in group B.

Inclusion Criteria

The Participants who meet the following criteria were included in this study.

- Age of patient 25 to 65 year suffering from Neck and arm pain for at least 3 months with a corresponding herniation involving one cervical nerve root (C6 or C7),
- Neck and arm pain for at least 3 months with a corresponding spondylosis involving C6 and/or C7),
- Pain intensity of arm pain of at least 4 on a scale from 0 (no pain) to 10 (worst possible pain) and NDI > 30.

Exclusion Criteria

- Patients with any previous cervical fractures or cervical spine surgery
- Signs of myelopathy
- Pregnancy
- Infection
- cancer
- generalized pain syndrome serious psychiatric or somatic disease and shoulder disorders that may interfere with outcome
- Abuse of medication/narcotic

Data Collection Procedure

Forty patients who were treated for CR in physiotherapy OPD of JPMC hospital in Karachi. Patients had understood the purpose of the study, and voluntarily signed the consent form prior to the experiment all subjects received the full explanation of the experiment and provided voluntary consent. All patients examined on the basis of specific tools VAS (visual analogue scale), NDI (Neck Disability Index) and GROC (Global Rating of Change scale) and pre reading were evaluated then treatment sessions

will be gives eight visits in four weeks Every patient assigned for four weeks rehabilitation programme. First visit consist forty five minute due to detail examination and pre reading evaluated on the basis of specific test then other visit consisted thirty minute duration. Every patient will be given eight visits in four weeks.

Treatment Procedure

Dry Needling Technique for CR

Patients in group A were treated by dry needling along with soft tissue mobilization. Dry needling portion of the treatment session was began with an evaluation of the neck and shoulder musculature for the presence of latent and/or active myofascial trigger points in CR patients. The following muscles will be evaluated, subscapularis, teres minor, supraspinatus, infraspinatus, deltoid (anterior, middle, posterior), trapezius (upper, middle, lower), levator scapulae, pectoralis major, latissimus dorsi, rhomboids (major, minor), biceps brachii and coracobrachialis. Therapists used clinical reasoning to determine which muscles to treat at each session based on findings from the physical and clinical examination. Once the muscles and specific myofascial trigger points to be treated have been localized, the therapists will use clean technique which is defined as hand-washing, the use of non-sterile gloves and an alcohol wipe to clean the skin prior to needling.²⁹ Seirin J-type steel needles will be used. The needle size will vary depending on the muscle targeted and will range from 0.30 mm × 40 mm for thin muscles such as the infraspinatus to 0.30 mm × 60 mm for larger muscles such as the latissimus or pectoralis major. The needle will be inserted directly into the myofascial trigger point at a depth of approximately 10---40 mm appropriate to the thickness of the muscle needle insertion, clinicians will perform a 'sparrow pecking' technique of moving the needle up and down approximately 3---5 mm at 1 Hz frequency in an attempt to elicit a local twitch response. Two session of dry needling conducted per week. Total duration of this technique was eight weeks of this study.

Manual Traction Technique for CR

Group-B received and manual traction of cervical spine along with soft tissue mobilization .Two sessions per weeks. Total eight session was provided at CR. patients an experienced manual physical therapist conducted the sessions with patients of two groups throughout the intervention period. In cervical traction, patients were asked to lie supine on the treatment table. Head was cradled by physiotherapist from chin and the occiput, then the physiotherapist applied traction force in 25 degree neck flexion. Traction was applied for 10 minutes in which pull for 10 sec and 5 sec rest were also applied. The traction force was equal to 10-15% of the body weight of each patient which was calculated prior to the intervention. Prior to applying these techniques, all patients received 10 minutes soft tissue mobilization at cervical spine. Total intervention period was 3 weeks with 2 sessions per week. The outcome measures used were Neck disability index (NDI), Numeric pain rating scale (NPRS), and Global rating scale.

Soft Tissue Mobilization for Both Group A and B

Group A and B received and Soft tissue mobilization along with dry needling and manual traction of cervical spine .Two sessions per weeks. Total eight session was provided at CR. patients an experienced manual physical therapist conducted the sessions with patients of two groups throughout the intervention period. In soft tissue mobilization patients were asked to sit on the treatment table. Deep pressure was applied to cervical muscle for 15 minutes.

Statistical Analysis

SPSS 20.0 for windows (SPSS Inc., Madison, WI, USA) was used to record and analyze collected data statistically. Demographic data were expressed in frequencies. Data was then analyzed for distribution pattern. The pattern of our data was normally distributed. Hence, a paired t-test was applied to check for significant mean difference between pre and post data of each parameter.

Ethical Consideration

Study was completed according to the guidelines of Belmont Report of Helsinki Declaration. The protocol was approved from Institutional approval board of Al-Shifa Rehabilitation

Center, IRB number ASC-PT-0122/11/2021.

RESULTS

Demographic & Anthropometric Data

The study was conducted to evaluate the effectiveness of lower cervical manual traction versus dry needling along with soft tissue mobilization upon neck pain and neck disability in patients with unilateral cervical radiculopathy. A total of 40 patients were taken and were divided into Group A (n=20) and Group B (n=20). All patients had a mean age of 40.3 (± 12.21) Years. A total of 7 males and 33 females were included in the study. In group A, 25% (n=5) were males and 75% (n=15) were females. Similarly, Group B had 10% (n=2) males and 90% (n=18) females. As far as occupation of patients were concerned, 37% of them were housewives (n = 15), 30% of them were physical therapists (n = 12), 12.5% were non-physiotherapy medical professionals (n=5), 5% were teachers (n=2) while 15% (n=6) had occupations other than aforementioned ones. Table 1 demonstrates demographic data for all the patients that were included in the study. Table 2 divides age and gender data between two groups.

Table 1: Demographic Data Of All Patients		
Characteristics	No of Participants (n)	Percentage (%)
Age in years	Mean = 40.3	-
Males	7	17.5%
Females	33	82.5%
Housewives	15	37%
Physiotherapists	12	30%
Non-PT Medical Professionals	5	12.5%
Teachers	2	5%
Others	6	15%

Table 2: Patients Characteristics Between Group A and B		
Characteristics of Patients	Group A	Group B
Mean Age (years)(\pm SD)	42.4 (\pm 12.34)	38.2 (\pm 12.01)
Males %	25% (n=05)	10% (n=02)
Females %	75% (n=15)	90% (n=18)

Baseline Reading

Before intervention of either dry needling or manual traction, patients were initially screened upon different parameters that included neck pain rating via Visual Analog Scale, change determinant via Global Rating of Change Score and neck disability through Neck Disability Index. Table 2 summarizes these pre-interventional data for both group A and B. Before the intervention of dry needling technique patients in group A had a mean score of 6.40(\pm 2.15) on Visual Analogue Scale (VAS), a mean score of -4.55 (\pm 1.35).on Global Rating of Change (GROC) Score and mean score of 45.85 (\pm 7.70) on Neck Disability Index (NDI). Secondly, before the intervention of manual traction, patients in group B had a mean score of 7.0 (\pm 1.45) on VAS, a mean score of -4.25(\pm 1.20) on GROCand mean score of 44.35 (\pm 7.13) on NDI.

Within group analysis on VAS, GRoC, and NDI

After 4 weeks of intervention in both groups, the same parameters were re-assessed for any significant difference. Patients in group A, who received dry needling technique had reduction in VAS with mean 2.15 (± 0.98), increase in GROC with mean 5.05 (± 1.14) and reduction in NDI with mean 20.5 (± 4.84). Patients in group B who received manual traction had also reduction in VAS with mean 3.40 (± 0.99), increase in GROC with mean 4.25 (± 1.40) and reduction in NDI with mean 26.20 (± 5.94). Test for normality was done before applying test for statistical significance within the group and across the group. Figures A1-A3 shows normality curve for group A parametric post results while Figures B1-B3 shows normality curve for group B parametric post results. Table 3 enlists parametric data between pre and post interventions within each group. Later, a paired *t*-test was applied between means of pre and post interventional data for each group. Table 4 enlists the results of paired *t*-test.

Table:3 within group analysis on VAS, GRoC, and NDI

Parameters	Group A (n=20)		Group B (n=20)	
	Pre Mean \pm SD	Post Mean \pm SD	Pre Mean \pm SD	Post Mean \pm SD
VAS	6.40 \pm 1.60	2.15 \pm 0.98	7.00 \pm 1.14	3.40 \pm 0.99
GRoC	-4.55 \pm 1.35	5.05 \pm 1.14	-4.25 \pm 1.20	4.25 \pm 1.40
NDI	45.85 \pm 7.70	20.5 \pm 4.83	44.35 \pm 7.13	26.2 \pm 5.94

An independent T-test was applied for between group analyses of post-results of both groups to find any significant difference between them. In terms of Visual Analogue Scale, Global Rate of Change and Neck Disability Index, group A suggested significant reduction in VAS and NDI compared to group B. However, no significant difference was found in terms of GROC between group A and B. Table 4 summarizes parametric outcomes along with the p-value of each parameter.

Within group analysis on VAS, GRoC, and NDI				
Parameters	Group A (n=20)		Group B (n=20)	
	Mean Difference	P-value	Mean Difference	P-value
VAS	4.25 (± 1.25)	< 0.05	3.60 (± 1.31)	< 0.05
GRoC	-9.6 (± 1.60)	< 0.05	-8.5 (± 1.46)	< 0.05
NDI	25.35 (± 6.52)	< 0.05	18.15 (± 4.68)	< 0.05

DISCUSSION

Our research findings suggested that in terms of selecting physical therapy technique, that involves either dry needling or manual traction for reducing neck pain and neck disability among patients with unilateral cervical radiculopathy, both treatments are effective. However, dry needling technique found to be more effective compared to manual traction in terms of reducing neck pain and neck disability. Although we have found no recent researches that drew direct comparison between dry needling and manual traction in terms of treating patients with unilateral cervical radiculopathy, there are few evidences in literature²⁸⁻³¹ that compared each of the two aforementioned modes of treatment with the other treatment interventions. Hence, a study that was conducted in 2021 by hong JG³⁰ and Kim YM that compared the effectiveness of manual traction with muscle energy technique (MET) and manual traction alone on neck pain and neck disability in patients with cervical radiculopathy. The study concluded that when muscle energy technique was added to manual traction in the course of treatment, it had better outcomes in reducing neck pain and neck disability compared to applying manual traction alone.³¹ Research findings of our study is similar to this study on the basis that our study also intervened manual traction alone in group B patients without blending any other treatment option within this group. This is why our study concluded with manual traction being less effective compared to dry needling technique. However, this limitation in our study should not be emphasized upon drawing a conclusion that dry needling is not effective. Therefore, the conclusion of our study that dry needling technique is more effective, our research findings are supported by another study conducted by Tabatabaiee et al in 2019³² in which similar patients compared to our study were included. This study compared effectiveness of three interventions that included dry needling, phonophoresis and pressure release technique to reduce neck pain and improve cervical range of motion (ROM) among patients with cervical radiculopathy. The study revealed that all of the three interventions were effective in terms of reducing pain and improving ROM but dry needling technique and phonophoresis were equally better than pressure release

technique. Hence, there are many other researches that suggests dry needling to be more effective compared to other treatment interventions available in this era.

CONCLUSION

Our research findings suggested that in terms of selecting treatment interventions that involves either dry needling or manual traction for reducing neck pain and neck disability in patients with unilateral cervical radiculopathy, both treatments are effective. However, dry needling technique proved to have better outcomes of reduction in pain and neck disability compared to manual traction.

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