INT. J. BIOL. BIOTECH., 15 (1): 47-53, 2018.

A RANDOMIZED CONTROLLED TRIAL TO INVESTIGATE THE EFFICACY OF MANUAL TRACTION ON PAIN AND RANGE OF MOTION IN CERVICAL RADICULOPATHY

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ABSTRACT

Manual cervical traction is seen to be therapeutic for patients suffering with the cervical radiculopathy disorder; however, its efficacy does not show positive results in randomized studies. To compare the effectiveness of the manual cervical traction with conventional active range of motion (AROM) exercises along with modalities in people suffering with cervical radiculopathy, subjects were enrolled in this study. The age range was between 25 and 55 years and subjects suffering from unilateral cervical radiculopathy. The Control group was given conventional AROM exercises and modalities along with transcutaneous electrical nerve stimulation (TENS) and superficial thermotherapy. Whereas experimental group was given the same treatment as control group along with an addition of manual cervical traction. The treatment session was planned for 2 weeks with six sittings per week. Neck Disability Index (NDI), Numeric pain scale, and cervical range of Motion were used as assessment tools. It was found that the neck pain and disability decreased in experimental group in just two weeks of treatment in contrast to control group ($P < 0.001$). The NDI in post treatment of the control group was (52.44 ± 9.91) while (25.42 ± 7.47) in the experimental group. The mean NDI score of experimental group lessened to 27.02 point. The after treatment mean score of control group was 6.06 ± 1.63, whereas 1.68 ± 0.58 was the mean score in experimental group after treatment. A significant improvement was recorded in the score of numeric pain scores ($P < 0.001$). It was concluded that patients experiencing the cervical radiculopathy disorder along with pain and disabilities can be treated with conventional AROM exercises and modalities. This paper also supports the treatment choices used for cervical radiculopathy in a multimodal approach.

Key-words: Cervical Radiculopathy, Disability, Pain, Manual Cervical Traction, Multimodal Approach,

INTRODUCTION

A physical disorder that is often confronted by the physicians is cervical radiculopathy. Deficiency of exercising, inactive lifestyle and intensifying stress levels are the causing agents of this condition and distorted body mechanisms lead to debility of the spine and its core muscles. The deteriorated muscles are subject to additional pressure and pain which ends in cervical radiculopathy (Young 2009, Polston, 2007; Radhakrishnan *et al.,* 1994). The factors of psychological, physical, and socioeconomic nature on the neck pain are mostly overlooked. As per the global burden of disease (2010) study, neck pain stands as the fourth chief causing agent in chronic disability, while back pain is the leading cause followed by depression and arthralgia.

About half of the population around the globe will encounter episodes of pain in their neck during their life (Fejer *et al.,* 2006). In an epidemiologic survey it was found that radiculopathy in the annual age-adjusted incidence was discovered to be 83 in 100,000 persons. There is considerable dissimilarity in the stated prevalence rates of the neck pain; nevertheless, most of the epidemiological studies account for an annual prevalence ranging between 15% and 50% (Fejer *et al.,* 2006; Hogg-Johnson, 2010) The prevalence of the pain is higher in females and maximizes in the middle age (Strine and Hootman, 2007; Tampin *et al.,* 2016; Christensen and Knardahl, 2014). Neck pain is associated with several comorbidities including headache, back pain, arthralgias, and depression (Bertozzi, 2013, Kuijper, 2009).

Neuropathic pain (e.g., stenosis or herniated disk) is categorized by radiation on one or both upper extremities, usually in a single dermatomal or multidermatomal (e.g., stenosis or a large or multilevel herniation) distribution. It is due to the fact that C6 and C7 are the most frequently altered nerve roots. The radicular indicators usually spread into the mid or first 2 digits (e.g., thumb and index finger), respectively (Magee, 2008). Non-neuropathic pain arising from midlevel facet joints, disks (e.g., C5-6), or the muscles rarely run into the upper arm, but referral patterns have a tendency to be non-dermatomal and more variable (Magee, 2002; Childs *et al.,* 2003; Harris,

2005).In pain stemming from the atlantoaxial, atlantooccipital, or upper facet joints or disks, radiation often extends into the occiput (Hubka *et al.* ,1997).Treatment for cervical radiculopathy is a hot topic of dispute amongst many clinicians and researchers and the current data demonstrate that conservative treatment is effective than the surgical preferences . Pain radiation from back to the neck, the scapular and the cervical exercises of stretching and boosting are providing mediocre liberation for mechanical neck pain.

In numerous patients who are suffering with cervical radiculopathy disorder, nonoperative treatment is found to be well-effective. When non-operative option of management of the neck and radicular pain is considered, it is significant to differentiate the acuteness of the development. The pain commencing from the nerve compression caused by a disk herniation typically presents a more acute appearance which can be with or without radiating extremity symptoms. Chronic, bilateral axial neck and radiating arm pain is generally caused by cervical spondylosis and may arise from a variation of sources, including the degenerative disk or the facet joints. A collection of physical therapy intercession has been anticipated to be applicable in the controlling of the cervical radiculopathy, including mechanical cervical traction, manipulation, therapeutic exercises and TENS.

An experimental study performed by Rai *et al. (*2013) supports that, even though tens and neck exercise are effective, the accumulation of intermittent cervical traction with tens plus exercise shows greater effectiveness in the management of cervical radiculopathy and that intermittent cervical traction should have a place in the management of cervical radiculopathy (Rai *et al.*, 2013). Emphasizing on the statistic that forthcoming studies and researches are needed to have substantiate findings that intermittent cervical traction, manual therapy, and deep neck flexor muscle strengthening can be advantageous in the management of cervical radiculopathy (Cleland *et al.*, 2005). With all these current progress in hand still the controversies exist, which are required to be targeted. So, this study is aimed at studying the additional benefits of traction in the management of cervical radiculopathy.

MATERIALS AND METHOD

In the physiotherapy OPDs of Mamji hospital and Ziauddin hospital, the study was conducted and 100 subjects were included with 50 men and 50 women. All the subjects came with complain of cervical radiculopathy with accompanying symptoms. The study was conducted for 1 year. The subjects were randomly allotted into 2 groups each having equal number of participants. One of group (controlled) acquired a combination of conventional AROM exercises and modalities with TENS and superficial thermotherapy. Manual cervical traction and combination of conventional AROM exercises, modalities including TENS and superficial thermotherapy were given to the other group (experimental).The inclusion criteria were the age of the participants that ranged from 25 to 55 years. The patients who were selected suffered with cervical radiculopathy looked after by a neuro-physician. Patients going through unilateral upper-extremity pain, paresthesia, or numbness were also included. Any patient with three out of four tests of clinical prediction ruling affirmative including Spurling`s test, Distraction test, Upper-Limb Tension Test 1 were selected as subjects plus those who had an ipsilateral cervical rotation $<60^{o}$ and who were not using any pain killer or steroidal medication. Patients suffering from other disorders of cervical spine with the history of previous cervical or thoracic spine surgery, bilateral upper-extremity symptoms, Indications of upper motor neuron disease, Medical (e.g., tumor, fracture, rheumatoid arthritis, osteoporosis, and prolonged steroid use) "red flags" were omitted from the study. The subjects were reviewed by obtaining pre-and post-treatment results using numeric pain scale, The Neck Disability Index (NDI) and measured Cervical Range of Motion in universal goniometer. The mean and standard deviations scores were calculated for the quantitative variables like age. Pain scores were obtained before the treatment and after the treatment in both control and experimental study group.

RESULTS

The study appointed 100 patients to verify the efficiency of the manual cervical traction versus conventional AROM exercises and modalities in cervical radiculopathy by a multi modal approach. SPSS 21 was used to accumulate and examine the data.

Fig.1 Gives the mean and standard deviation of pain scores of patients in control and Experimental group at pre and post stage. It was found that mean and standard deviation of pain scores of patients in control group at pre and post stage was 7 ± 1.64 and after the treatment, at post level it was 6.06 ± 0.63, alternatively experimental group pre stage pain score was 6.94 ± 1.57 and after the treatment, at post level it was 1.68 ± 0.57, significantly getting down, showed that pain score was reduced at post level in experimental group.

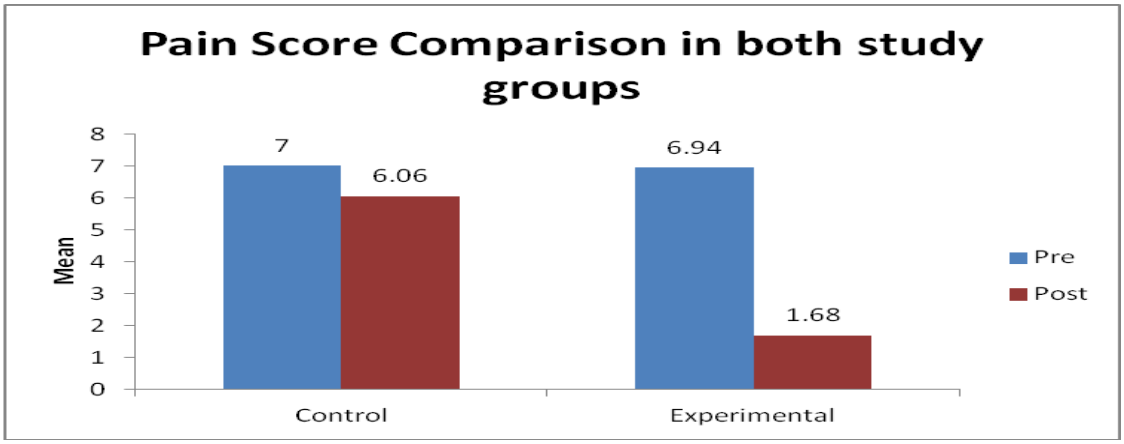

Fig.1. Mean pain score at pre and post stages in both study groups.

Fig.2 gives the mean and standard deviation of pain scores of patients in control and Experimental group at pre and post stage after taking the effect of Age into two separate groups of age having less or equal to thirty five years old and more than thirty five years , It was found that in control group the patients with age ≤35 years old , pre stage pain was 6.90 ± 1.75 and after the treatment, at post level it was 5.90 ± 1.81, similarly in the age group >35 years old mean pain score at pre stage was 7.07 ± 1.58 and at post stage it was 6.17 ± 1.51.

In Experimental group patients with age ≤35 years old, pre stage pain was 6.62 ± 1.43 and after the treatment, at post level it was 1.81 ± 0.62, also in the age group >35 years old mean pain score at pre stage was 7.17 ± 1.64 and at post stage it was 1.59 ± 0.56, from pre to post level mean pain scores of experimental group got significantly down having p value < 0.01 signifying the improvement in pain.

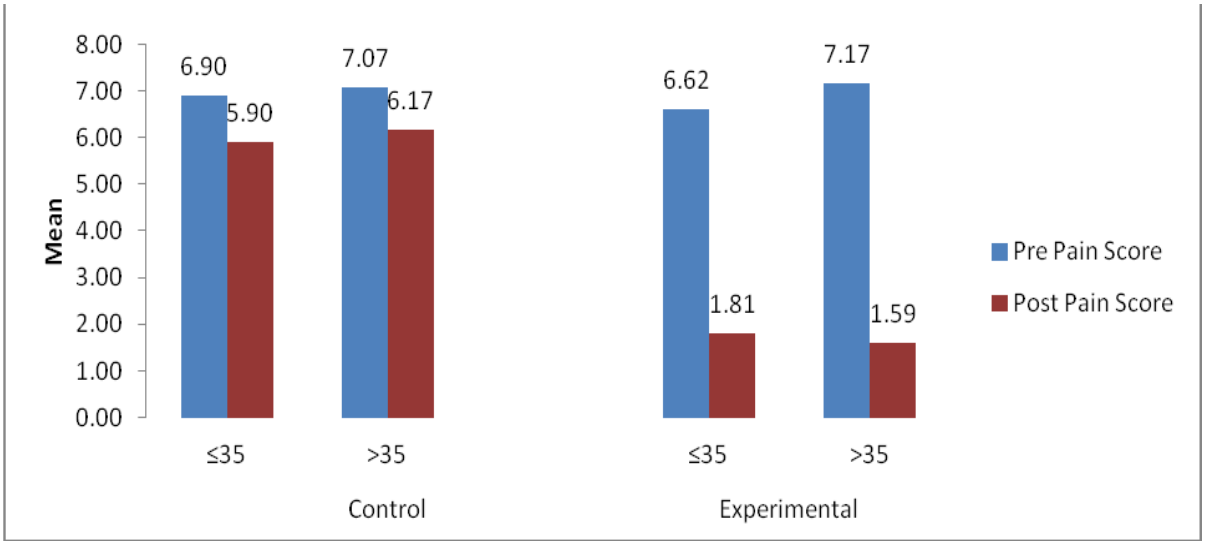

Fig.2. Mean at pre and post stages in both study groups with respect to each age group.

Fig.3 gives the post treatment pain scores in both treatment groups. It was found that in Control group mean pain score after the treatment was 6.06 ± 1.63, while in the group of Experimental mean pain score after the treatment was 1.68 ±0.58, a significant p-value (P<0.01) was obtained using independent sample t-test, concludes that mean pain score after the treatment in both groups were not same and patients in Experimental group significantly have less pain score after the treatment as compare to the patients in control group.

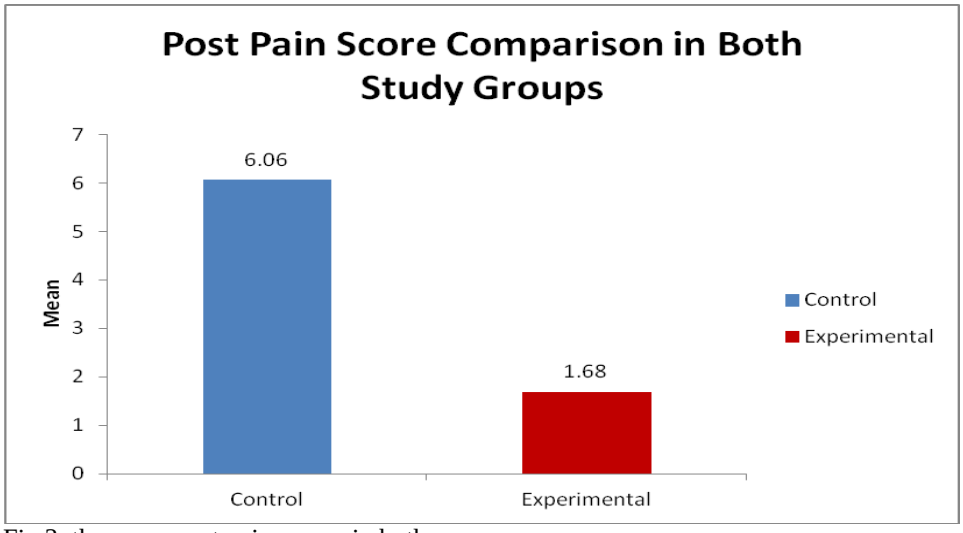

Fig.3. the mean post pain scores in both groups,

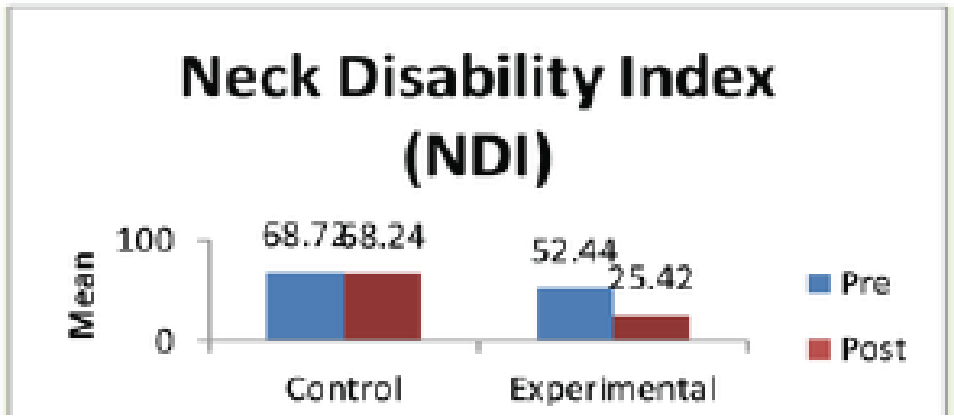

Fig.4. the mean NDI at pre and post stages in both study groups.

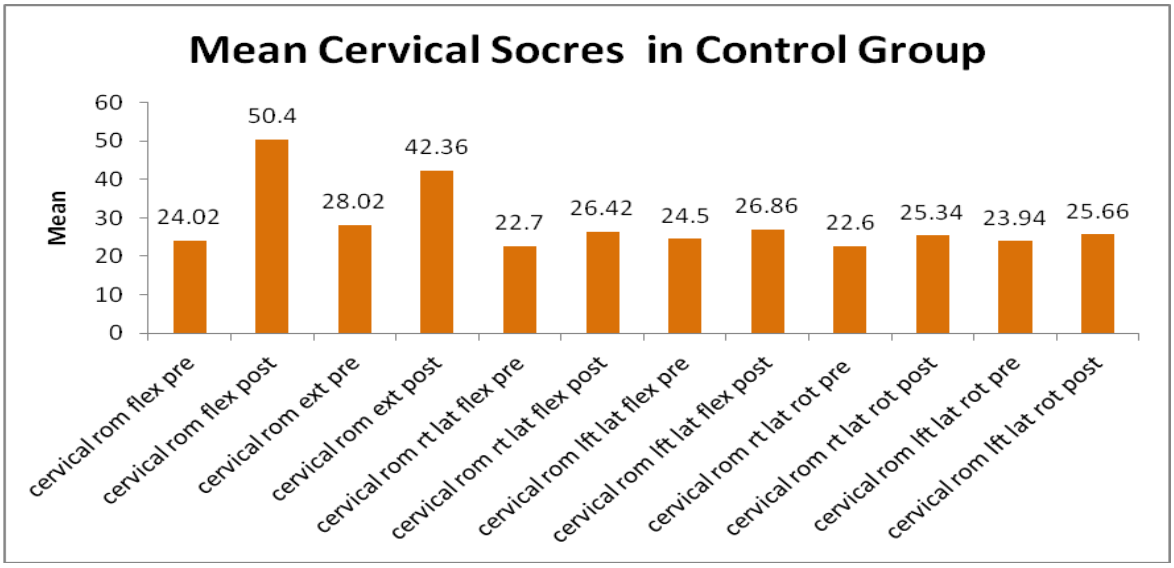

Fig.5. the mean cervical ROM scores at pre and post stages in control group.

Fig.4 gives the mean and standard deviation of neck disability index (NDI) of patients in control and experimental group at pre and post stage. It was found that at in control group pre stage NDI was 68.72 ± 12.82 and after the treatment, at post level it was 52.44 ± 9.91, alternatively in Experimental group at pre and post stage, It was found that at pre stage NDI was 68.24 ± 12.08 and after the treatment, at post level it was 25.42 ± 7.47, from pre to post level mean NDI significantly got down in Experimental group.

Fig.5. Gives the mean and standard deviation of Cervical scores of patients in control group at pre and post stage.

Fig.6 gives the mean and standard deviation of Cervical scores of patients in experimental group at pre and post stage.

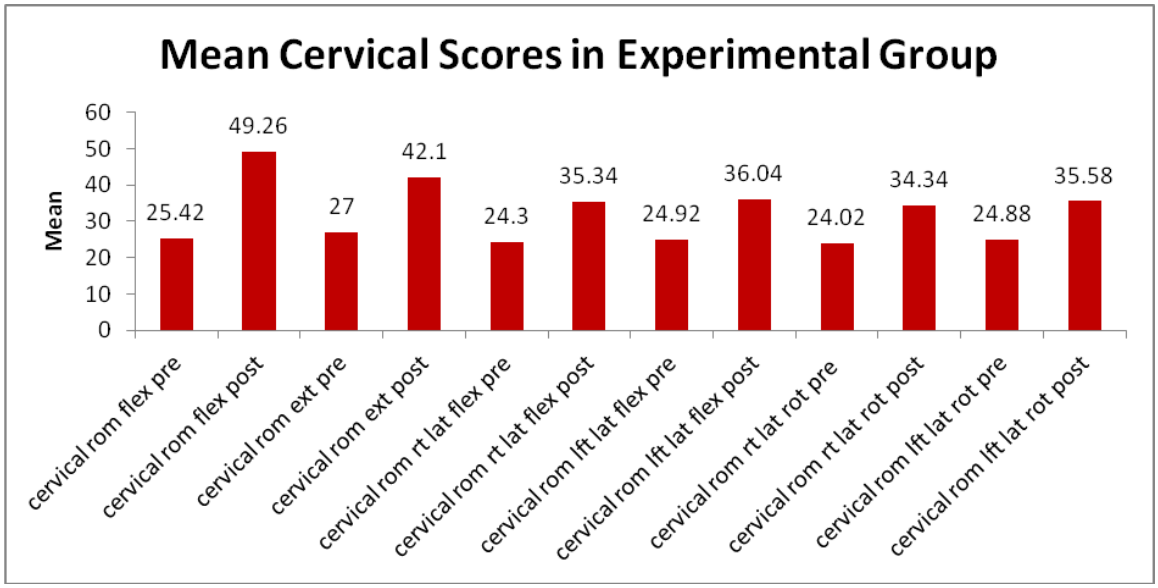

Fig.6. the mean cervical scores at pre and post stages in experimental group.

Fig.7 presents the mean and standard deviation of cervical scores in Control and experimental group; an independent sample t-test was also used to see the mean differences between two study groups. It was found that cervical rom flexion and cervical rom extension did not have any significant mean differences in control and experimental group but all other parameters reported in table have significant mean differences at post level in control and experimental group.

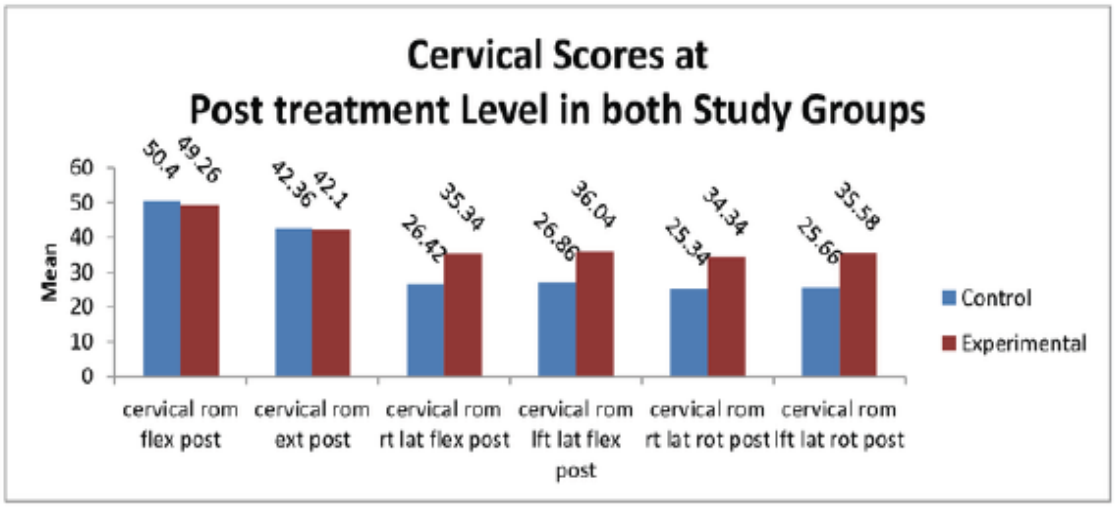

Fig.7. the mean cervical scores post treatment in both Study Groups.

DISCUSSION

Few randomized, controlled trials address patient outcomes after cervical traction. Important findings were seen in many of the studies but their clinical associations are yet to be discovered. Some studies presented their results using the new device for applying traction while others gathered results through new protocols. The efficiency of these appliances and approaches are needed to be studied further before their clinical application. This study concludes that the autonomous symptoms and pains were decreasing after the treatment when studied for experimental group plus enhanced cervical range of motions. It was noted that fewer treatment sittings were required for the experimental group in contrast with control group. The symptoms of experimental group vanished easily with respect to the symptoms of the other group.

Aker *et al*., (1996) mentioned various traditional management of neck pain linked with cervical radiculopathy. They have tested these methods in their study and contradictory results were presented. In present days, no regime is being followed. The study was performed to investigate and find innovative treatment standards with respect to the usefulness of cervical radiculopathy. The study compared modalities aiming at the treatment of cervical radiculopathy and conventional AROM exercise.

Young *et al*. (2009) observed the properties of exercise and manual therapy with and without the cervical traction and its impacts on pain function. They also observed its effects on disability in patients. No noteworthy variance was found amongst the group concerning primary or secondary results at 2 and 4 weeks. The results prove that the appendage of mechanical cervical traction with a multimodal treatment procedure of manual rehabilitation and exercise gives no vital advantage over functioning, pain, and disability in a patient suffering from cervical radiculopathy. The significant findings of our study correspond to the previous study. The group which was treated with manual cervical traction displayed positive results in dismissing pain and unilateral symptoms while reinstating the patient's daily activity.

A study carried out by Joshua *et al*. (2005) explains the conclusions of a series which included a total of 11 patients who were offered physical therapy who were suffering with cervical radiculopathy. These patients were administered manual physical therapy and cervical traction. The subjects were dealt with identical methods which includes manual physical therapy, cervical traction, strengthening exercises of the deep neck flexors and scapulothoracic muscles.

91 percentile (10 of 11) of the patients suffering with cervical radiculopathy in above mentioned case series improved, but however, due to a cause-and-effect connection cannot be inferred from a case series, the study proposes that follow-up randomized clinical trials should be performed to further investigate the effectiveness of manual physical therapy, cervical traction, and strengthening exercises in a homogeneous group of patients with cervical radiculopathy, hence supporting our need to conduct this study with better sample size and good measuring of patients outcomes.

Also, another study conducted by Joshua *et al*. (2007) suggested that a subset of predictor variables can accurately identify which people with cervical radiculopathy are likely to experience short-term successful outcomes. But the study design did not allow for the identification of a cause and-effect relationship, but it finds out to appear that intermittent cervical traction, manual therapy, and deep neck flexor muscle strengthening may be beneficial in the management of cervical radiculopathy, commenting that future research is needed to substantiate these findings stressing on the need to evaluate the role of manual cervical traction in treating symptoms associated with cervical radiculopathy.

When treated experimental group participants with Manual cervical traction technique, marked reduction in pain intensity and unilateral symptoms was observed within 2 weeks along with functional restoration that was due to an increase of intervertebral space and relaxation of spinal muscles.

The former stated literatures displayed no long term follow ups along with no measures of functional improvement. There was no necessity of long term follow up because of the enhancement in function plus declining in the intensity of pain in the patients who were treated with manual cervical traction technique.

CONCLUSION

Cervical Radiculopathy is an illness that is seen in patients suffering from neck pain. This type of pain starts from arms, feeling of numbness in upper limbs and motor weakness. A diversity of discussions and treatments are found in the literature with counterfeit results. Current literature aids in procedures linking to various interventions. The outcomes of this survey are also backed up the fact that cervical traction is more useful when it is mixed with conventional AROM exercises and modalities in cervical radiculopathy with a multimodal approach

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(*Accepted for publication November 2017*)