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EFFECTIVENESS OF MANUAL TRACTION AND OTHER PHYSIOTHERAPY TREATMENT IN THE MANAGEMENT OF PAINFUL CERVICAL RADICULOPATHY

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ABSTRACT

Background: Cervical radiculopathy, generally entitle as pinching of the nerves which causes severe shooting pain which mostly pass through the shoulder. Along with it causes muscle weakness and numbness into the arm and hand. In majority of the cases, cervical radiculopathy responds well to conservative mode of treatments which incorporate physical therapy with medical management. The aim of this study is to uncover the effective and evidence based conservative treatment of cervical radiculopathy.

Method: Randomized controlled trial study conducted from January 2014 to December 2014. Participants were recruited from physiotherapy OPDs of tertiary care hospitals. A total number of, 100 subjects with a ratio of 50 men and 50 women were recruited between the ages of 25 and 55 years with unilateral cervical radiculopathy. Control group received combination of conventional AROM exercises and modalities including TENS and superficial thermotherapy as a treatment while experimental group received manual cervical traction and combination of conventional AROM exercises, modalities including TENS and superficial thermotherapy. For both groups, treatment was designed for two weeks (6 sessions/ week). Improvement in symptoms was assessed by evaluation of both groups on the basis of visual analogue scale (VAS).

Results: After 2 weeks of treatment, patients with neck pain showed marked decreased in pain as compared with the control group ($P < .001$). For pre and post level a paired sample t-test was used and the results with p-value less than 0.05 were considered as significant. Mean difference of 0.94 (VAS) with a significant p-value ($P < 0.01$) was obtained shows the respective improvements in the numeric pain scale scores.

Conclusion: Manual cervical traction when used with conventional AROM exercises and modalities were effective methods for decreasing pain in cervical radiculopathy. Recent literature supports such protocols involving multiple interventions. Results of this study also supported the treatment options in cervical radiculopathy in a multimodal approach.

Keywords: Cervical Radiculopathy, Manual Cervical Traction, Multimodal Approach, Pain.

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INTRODUCTION

Radiculopathy of cervical spine is malfunction of nerve root of the cervical spine which is frequently seen in the physical therapy clinic. The seventh (C7; 60%) and sixth (C6; 25%) cervical nerve roots are the most commonly affected. The core muscles of the spine are weakened due to the sedentary life style, lack of daily exercises and continuously increasing physical and mental stress level that altered body mechanics and causes muscular instability. The symptoms of cervical radiculopathy are triggered by additional stress on this weakened structures [1, 2, 3].

An epidemiologic survey of a population based study showed the annual aged – adjusted incidence of radiculopathy to be 83 per 100,000 persons. The consequences of cervical pain due to alteration in physical, psychological and socioeconomic status are usually under valued. The cervical discomfort or soreness is the 4th primary source of years leading to disability, as per ranked by a study in 2010 by Global Burden of Disease³. It was also explored in this study that around half of all the participants suffer from a clinically significant cervical soreness during their life duration [4].

Cervical radiculopathy is usually allied with numerous other complications including headache, radicular pain, and numbness and different dermatomal complains. The most of the epidemiological research studies notify annual prevalence between 15% and 50%. The middle aged females show much higher frequency of neck pain [3, 4, 5, 6].

The reasons related to the advancement and progression of cervical tenderness overlie substantially with other musculo-skeletal pathologies^{3,4,5,6}. Cervical pain can be classified as mechanical, neuropathic and radiating pain from the heart or other vascular conditions. Pain in facet joints, diskogenic pain and myofascial pain are the examples of mechanical pain. Neurological pain represents a pain which primarily resulting from any damage or pathology related to the peripheral nervous system. The pain arising from the herniated disc, osteophytes and spinal stenosis is one of the most familiar illustrations of peripheral radiculopathy [7].

The other causes which are related with cervical pain and which partly cover other rheumatologic disorders are hereditarily, psychological factors (example hopelessness, nervousness, poor managing ability etc.), sleep disorder, smoking and inactive life style. The outcomes of different epidemiological surveys have frequently but not constantly establish a constructive relation among the cervical and shoulder pain [8, 9].

Prevalence of neck pain in obese individuals compared with non – overweight people are may be due to elevated systemic inflammation, decrease muscle strength, augmented involuntary stress, ground reaction force, additional psychological problems and larger number of impairments associated with kinesophobia [9, 10]. People may experience cervical soreness or stiffness following any traumatic cerebral injury, whiplash damage, numerous sports induced trauma as well. Some studies indicate higher prevalence of

neck pain at their major work place especially in some of the professions like computer personnel, health care professionals.

In cervical spine, different structures can cause neuropraxia at root level. In the sub axial vertebrae, every moving segment is comprises of around five joint formations for example two facet joints and two neuro central joints with the intervertebral disk between the two segments and the nerve roots exit laterally. As far as the lower lumbar spinal nerve exits below the level of the subsequent pedicle. Consequently, the disc herniation of L3-L4 will constrict the root of L4, not the leaving root L3 [11].

The several schemes of classification, duration are conceivably the superlative interpreter of result. It is evident that the treatment of short time period is much more effective in prognosis than prolong time period for pain management [12, 13, 14]. The relationship existing between the prolong period of cervical pain and poor outcome is constant in the results of a cohort studies [15, 16, 17]. The reasons behind the poor prognosis are included as older age, female gender, psychosocial circumstances, and radicular symptoms [18, 19].

The effect of manual cervical traction on pain was primarily studied in this study. Manual traction is effective in relieving pain due to cervical radiculopathy [21]. In 75% of cases, cervical radiculopathy is treated conservatively and is based on rehabilitation process. The rehabilitation programs are many-sided and involve a number of physical methods of different efficacy [20].

The motivation for the cervical traction is the increase of intervertebral joint space and realignment of spinal muscles is assumed to be the most important of the proposed mechanisms by which traction could be successful [21].

Transcutaneous electrical nerve stimulation (TENS) widely imolemented to cure pain [24]. It is hypothesised that low rate TENS is assumed for the production of enkephalin & endorphins. Pain relief has a quick onset & literatre shows that stimulation is useful for the extended periods of time [22].

METHODOLOGY

Study Design and sampling:

An experimental study was conducted in physiotherapy OPDs of tertiary care hospitals of Karachi, 100 subjects including 50 men and 50 women were recruited with diagnosis of cervical radiculopathy. Simple random sampling was conducted into two groups 1) control group n= 50 with mean age of 38.08 + 8.5 years 2) experimental group n= 50 with mean age of 38 + 9 years. Methodology of block randomization was implemented to maintain the number of patients same in each group. All patients were treated for two weeks to complete the 12 physical therapy sessions. The control group was treated with a combination of conventional AROM exercises and modalities including TENS and superficial thermotherapy. The experimental group was treated with the protocol as the control group

along with additional manual cervical traction. Patients were trained skillfully to execute all the exercises daily, 25 repetitions each two times in a day. TENS as a pain relieving modality was given to both groups for 20 minutes with intensity as desired by patients on constant mode. Intermittent manual cervical traction by towel method was given for 20 minutes with 10 seconds traction period and 5 second rest, as it is evidence based and effective treatment time for vertebral separation [26]. Different Studies have shown that the maximum mean vertebral separation occurs at 20 min without the exacerbation of patient's symptoms[23].In both groups, neck pain was measured using visual analogue scale (VAS) before and after completing all 12 treatment sessions. The duration of study was one year. All the participants were regular patients who signed an informed approval/consent form approved by the internal ethical committee of that particular tertiary care hospital.

Inclusion criteria:

The participants were recruited on the basis of diagnosis as cervical radiculopathy referred by neuro-physician perceiving pain rating according to VAS (1 to 10). Patients having unilateral upper-extremity pain, numbness or paresthesia along with 3 or 4 clinical test positive including spurling test, upper-limb tension test (ULTT), distraction test, and having ipsilateral cervical rotation greater than 60°.

Exclusion criteria:

Patients with the other pathologies, like tumor, fracture, pregnancy, rheumatoid arthritis, trauma, osteoporosis, vertigo by any cause, patients with bilateral upper limb radiculopathy and prolonged steroid use were excluded from participating.

Data Analysis:

Treatment scores were compared by using SPSS version 21. Statistics were calculated in the form of frequencies, percentages, Paired sample T test and Independent T test.

Mean and standard deviations were reported for the variables quantitative in nature, like age, pain Scores before the treatment and pain score after the treatment in both control and experimental study group. Count with percentages were given for the gender age group, extremity affected and level of pain before the treatment and after the treatment reported by the patients in control and experimental group. To compare the mean differences of pain scores in control and experimental group at pre and post treatment level a paired sample t-test was used and the results with p-value less than 0.05 were considered as significant. Pain scores at pre and post treatment level were also tested after taking the confounding effect of age groups and gender using paired sample test in both study groups, independent sample t-test was used to see the mean differences in the post pain score of the patients of control and Experimental group .Bar charts are used to display the graphical representation of mean scores and other basic characteristics of data.

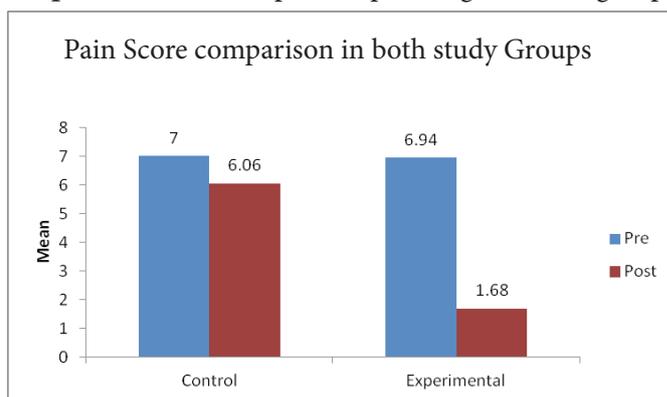
RESULTS

The study allocated total 100 patients to determine the effectiveness of the manual cervical traction versus conventional AROM exercises and modalities in cervical radiculopathy. Out of 100 samples 50 were in control group while 50 were in Experimental group. Male to female ratio in both study group were same. Mean age and standard deviation in experimental group was 38 ± 9 years, 58% patients were more than 35 years old in both study groups. 32% in control were extremity affected from left while in experimental group it was 38%. In experimental group 44% of patients showed severe level of pain before treatment and 100% improved to mild level of pain in the same group after the treatment.

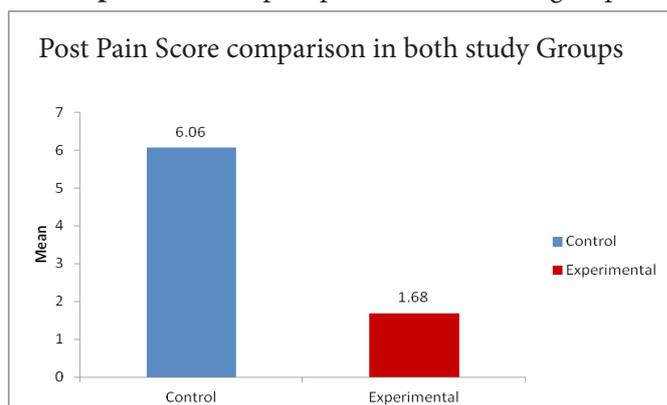
The mean and standard deviation of pain scores of patients in Experimental group at pre and post stage. It was found that at pre stage pain was 6.94 ± 1.57 and after the treatment, at post level it was 1.68 ± 0.57, from pre to post level mean pain score significantly get down about 5.26 point, p value was found less than 0.01 using paired sample t-test that showed that mean pain score in at pre and post level were not same.

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 that 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.

Graph 1: Pain score at pre and post stages in both groups



Graph2: Mean of post pain scores in both groups



DISCUSSION

Limited studies were conducted to check out the outcomes after cervical traction. On the other hand some of the studies gave statistically significant conclusions but the concrete clinical implications of these outcomes are not apparent. There are certain studies which are conducted on protocols of new devices for the application of cervical traction but the evidences for the effectiveness of these devices and techniques need to be studied further. This study showed marked decrease in pain intensity after treatment in experimental group as they required less treatment sessions than control group.

Subhash C. R *et al*, conducted a study in which they found the same results showing the efficacy of TENS, neck exercises and intermittent cervical traction. They also concluded that exercises and intermittent cervical traction is efficient in the treatment of cervical radiculopathy and must have a considerable position in the management of cervical radiculopathy [24].

Another study conducted by Umar *et al*, explored the effectiveness of cervical traction combined with core muscle strengthening exercises in cervical radiculopathy. They concluded that multimodal approach combined with cervical traction and core muscle strengthening exercises produces more positive results in managing pain than a single intervention [25]. On the other hand the findings of our study suggested that manual cervical traction technique with superficial heating pads with TENS was found best and effective in relieving pain and restoring patient's functions of activities of daily living with significant improvement in symptoms bearing good patient outcomes. The key factor in conducting this study was not only to see efficacy of cervical traction in painful radiculopathy but also to set statistical evidences in new treatment standards with keeping combination therapy in mind.

The results of our study is also supported by Dibyendunarayan *et al*, they measured the effectiveness of mechanical cervical traction on patients with unilateral mechanical neck pain. They concluded that even though conventional therapy is affected but they recommended mechanical cervical traction as better physical therapy intervention to manage mechanical neck pain [26].

A case series on geriatric population conducted by Steven W. Forbush *et al*. measured the effects of multimodal conservative approach in patients with degenerative cervical radiculopathy. They studied 10 patients in which intermittent cervical traction was used with manual therapy (HVLA thrust) of the upper thoracic and cervical spine and deep cervical flexor strengthening exercises for 6 to 12 sessions over a period of 3 to 6 weeks. They concluded that intervention resulted in substantial improvement in numeric pain rating scale and neck disability index (NDI) [27].

The present study showed that pain and unilateral symptoms had reduced in intensity after treatment in experimental group with improved cervical range of motion and they required less treatment sessions as compared to con-

trol group.

CONCLUSION

Hence it is concluded that cervical radiculopathy is a severe painful and hurting pathology causing muscular weakness and sensory alterations in unilateral or bilateral upper extremities. We observed a diversity of treatment techniques in comprehensive literature review with insignificant consequences. The results of this study support such protocols involving multiple interventions that is cervical traction is more useful when it is combined with conventional active range of motion exercises and modalities in painful cervical radiculopathy.

RECOMMENDATIONS

This is a limited study only focused on pain measurement through numeric pain rating scale and the further outcomes can be measured by using different assessment parameters like neck disability index, upper limb muscle power or strength improvement. Multidimensional physical therapeutic strategies like mechanical cervical traction, deep neck flexor strengthening exercises, muscle energy technique, cervical manipulation can also be recommended to evaluate the results in patient with cervical radiculopathy.

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