

EFFECTIVENESS OF TENS VERSUS INTERMITTENT CERVICAL TRACTION IN PATIENTS WITH CERVICAL RADICULOPATHY

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ABSTRACT

Background: Cervical radiculopathy is a dysfunction of nerve root of the cervical spine where C6 & C7 nerve roots are the most commonly affected. It encompasses important symptoms other than pain, such as paresthesia, numbness and muscle weakness in dermatomal or myotomal distribution of an affected nerve root. A multitude of physical therapy interventions have been proposed to be effective in the management of cervical radiculopathy, including mechanical cervical traction, manipulation, therapeutic exercises and TENS. Studies to find out the effectiveness of TENS versus Intermittent Cervical Traction among patients with Cervical Radiculopathy are sparse.

Hence the present study was undertaken to find out and compare the effectiveness of TENS versus Intermittent Cervical Traction a newer technique towards betterment in treatment of cervical radiculopathy patients.

Methodology: 30 patients from Baroda association for the blind (Lions club of Baroda), Subhanpura & Sushrut Physiotherapy Clinic, Akota were chosen based on the inclusion and exclusion criteria. Group A comprised of 15 people with cervical radiculopathy were given TENS with Isometric neck exercises and active neck movements. Group B comprised of 15 people with cervical radiculopathy were given Intermittent Cervical Traction with Isometric neck exercise and active neck movements. VAS Scale & Neck Disability Index (NDI) were used as outcome measures pre & post treatment.

Results: The pre test evaluation showed that, there is no significant difference ($P > 0.05$) between the two groups for all the variables measured. The post-test evaluation of both groups showed a very high significance ($P < 0.05$) within the group for all the outcome measurements. A post-test comparison of measured variables, between the groups showed that the Group A demonstrated a statistically significant ($P < 0.05$) reduction in pain and Neck Disability Index.

Conclusion: From the above study concluded that TENS was more effective in the management of cervical radiculopathy along with isometric neck exercise, in reducing both neck & arm pain, neck disability & in improving activities of daily living.

KEYWORDS: Cervical Radiculopathy, TENS, Intermittent Cervical Traction Isometric Neck Exercise, Neck Disability Index.

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INTRODUCTION

Cervical radiculopathy is a dysfunction of nerve root of the cervical spine where C6 & C7 nerve roots are the most commonly affected.^{1,2} In the younger population, it is a result of a disc

herniation or an acute injury causing foraminal impingement of an existing nerve whereas in older patients, cervical radiculopathy is often a result of foraminal narrowing from osteophyte formation, decreased disc height, degenerative changes of the uncovertebral joints anteriorly

& of the facet joints posteriorly.^{1,2}

It encompasses important symptoms other than pain, such as paresthesia, numbness and muscle weakness in dermatomal or myotomal distribution of an affected nerve root.^{1,2}

Although patients with cervical radiculopathy may have complaints of neck pain, the most frequent reason for seeking medical assistance is arm pain.²

The first choice of management of cervical radiculopathy is non-operative, and various noninvasive interventions have been used with mixed results. A multitude of physical therapy intervention have been proposed to be effective in the management of cervical radiculopathy, including mechanical cervical traction, manipulation, therapeutic exercises and TENS.² TENS stands for Transcutaneous Electrical Nerve Stimulation used to treat pain.³

Pain control TENS units typically produce a continuous train of pulsed current at frequencies in the range 1 to 120Hz, some as high as 200Hz. The pulses are normally rectangular, or close to rectangular, in shape, biphasic & the pulse duration is normally 50-200us.³ The aim is selectively to excite A-B(beta) [sensory] nerve fibers & produce an analgesic effect by 'gating' signals conveyed by pain {A-S(delta) & C} fibers. High rate TENS optimally stimulates A-B (beta) fibers, not because of its higher frequency but small pulse width. The short pulse duration results in preferential recruitment of the largest diameter nerve fibers.

Pain relief has a rapid onset & the stimulation can be used for extended periods of time in a day and for a longer period.³ Low rate TENS is assumed by some to optimize the production of enkephalin & endorphins. Brief intense TENS has a rapid induction & is used for more intense pain, such as prior to or following a painful local procedure.³ ICT has the mechanical benefit of temporarily separating the vertebrae, causing mechanical sliding of the facet joints in the spine, & increasing the size of the intervertebral foramina. If done intermittently, this motion may help reduce circulatory congestion & relieve pressure on the dura, blood vessels, & nerve roots in the intervertebral foramina.⁴ Studies to find out the effectiveness of TENS versus ICT

among patients with cervical radiculopathy are sparse. Hence the present study was undertaken with an intention to find out and compare effectiveness of TENS versus ICT a newer technique towards betterment in treatment of cervical radiculopathy patients.

METHODOLOGY

Method of data collection:

30 patients from Baroda association for the blind (Lions club of Baroda), Subhanpura & Sushrut physiotherapy clinic, Akota were chosen based on the inclusion and exclusion criteria. Patients were explained about the study.

Inclusion criteria

- 1) Both the sexes between age group 40 to 60 years were taken.
- 2) Symptoms positive to cervical radiculopathy
- 3) Patients showing positive cervical compression test, manual cervical distraction test,
- 4) Symptoms limited to lower cervical spine(C 5, 6, 7)

Exclusion criteria

- 1) Cervical instability
- 2) Cord compression
- 3) Spinal tumors
- 4) Spinal infections
- 5) Previous spinal injury
- 6) Recent motor vehicle accident involving cervical spine
- 7) Systemic disease
- 8) Severe osteoporosis
- 9) History of psychological or physical illness

Study design: prospective longitudinal interventional study

Interventions

Group A comprised of 15 people with cervical radiculopathy given TENS with Isometric neck exercises and active neck movements.

TENS parameters:-Frequency: 5Hz Intensity: high
Pulse duration: 300 Micro sec.

Duration: 20 minutes, 4 session/week.

Electrode placement: Area of greatest intensity of pain,

Group B comprised of 15 people with cervical radiculopathy were given ICT with Isometric neck exercise and active neck movements.

Traction parameters:-Traction force: 1/8 of body weight

Ratio of hold: rest- 4:1 Duration: 15min once a day 4 session/week.

Patient position: supine lying

Samples size: 30 subjects (15 in each)

Study duration: The total duration of the study is 1 week.

Outcome measures: VAS Scale, Neck Disability Index

RESULTS

The collected data was analyzed using the Graph Pad Prism 6. The data collected by Neck Disability Index was analyzed using parametric tests as the data was interval in nature. The intra group pre and post-test data for NDI were analyzed using paired t-test, while the post-test inter group data were analyzed with unrelated t-test. The data collected by visual analog scale were analyzed using non-parametric tests as the data is ordinal in nature. The intra group pre and post-test VAS scores was analyzed using Wilcoxon signed rank test, and post-test inter group VAS scores were analyzed with Mann Whitney U-test. The statistical significance or the P value for all the analyzed data was fixed at 0.05.

The mean age for Group I was 46.6±6.15 and Group B was 49.40±6.60 as shown in Table-1.

Group I consisted of 15 subjects (n = 15), with a gender distribution of 12 males (80%) and 3 females (20%). Group II also consisted of 15 subjects (n=15) and a gender distribution of 9 males (60%) and 6 females (40%). This data is presented in Table-2.

The mean and the standard deviation (SD) of pre and post-test NDI scores for both, Group I and Group II are presented in Table -3. Compared with the base line, the post-test mean NDI score for Group I was 16.4±0.7 and Group II was 20.6±2.25. The intra group pre and post-test analysis of the NDI score in Group I shows $p < 0.01$, $t_{cal} = 19.32$, which is highly significant statistically ($p < 0.05$). These results are

presented in Table-6 & fig-2. The results presented in Table -9 and Fig-4 shows the post-test comparison of the NDI scores between Group I and Group II. Group I shows $p < 0.0028$ which is statistically significant ($P > 0.05$). The mean and the standard deviation (SD) of pre and post-test VAS scores for both, Group I and Group II are presented in Table-4 & fig-3 & 4. Compared with the base line, the post-test mean VAS score for Group I was 6 ± 1.14 and Group II was 4.6 ± 1.04 . The pre-post test comparison of VAS score for Group I ($t_{cal} = 20.02$, $p < 0.002$), shows a statistically highly significant reduction in reported rate of pain after one week of intervention. The post test comparison of VAS score between the two groups reveals that Group I fared better than Group II as shown in table 10.

Table 1: Showing Age, mean, SD for Group I & II.

	GROUP-1	GROUP-2
AGE		
MEAN	46.6	49.4
SD	6.15	6.6

Table 2: Percentage of gender distribution in both the groups

	Group -1	Group -2
Gender		
Male	80	40
Female	20	60

Table 3: MEAN & SD for NDI for Group I & II.

	Group -1		Group -2	
	Mean	SD	Mean	SD
PRE TREATMENT	25	1.4	25.4	4.14
POST TREATMENT	16.4	0.7	20.6	2.25

Table 4: MEAN & SD for VAS Scale for Group I & II.

	Group-1		Group-2	
	Mean	SD	Mean	SdD
Pre treatment	6.5	1.12	4.2	1.15
Post treatment	6	1.14	4.6	1.04

Table 5: NDI for ICT pre & post treatment.

NDI(ICT)	Pre Treatment VS Post Treatment
P Value	$P < 0.001$
T_{cal}	18.33

Table 6: NDI for TENS pre & post treatment.

NDI TENS	Pre Treatment V/S Post Treatment
P Value	<0.001
Tcal	19.32

Table 7: VAS for TENS pre & post treatment.

VAS for TENS	Pre & Post Treatment
P Value	P<0.002
Tcal	20.02

Table 8: VAS for ICT pre & post treatment.

VAS score ICT	Pre and post treatment
P Value	P<0.0001
Tcal	9.283

Table 9: Post treatment NDI difference between TENS v/s ICT.

NDI	Post treatment TENS V/S ICT
P Value	P<0.0028

Table 10: Post treatment VAS scoredifference between TENS v/s ICT.

VAS score	Post Treatment TENS V/s ICT
P Value	P<0.003

Fig. 1: NDI for ICT pre & post treatment.

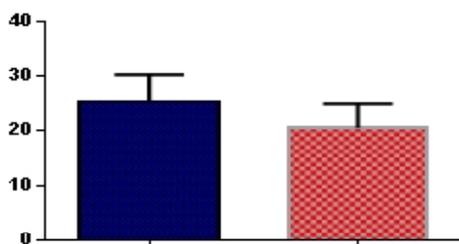


Fig. 2: NDI for TENS pre & post treatment.

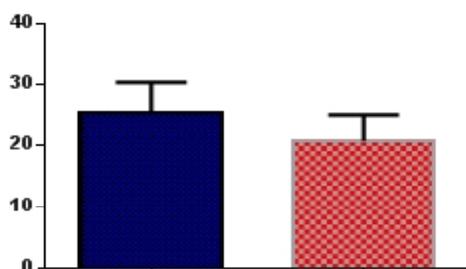


Fig. 3: VAS for TENS pre & post treatment.

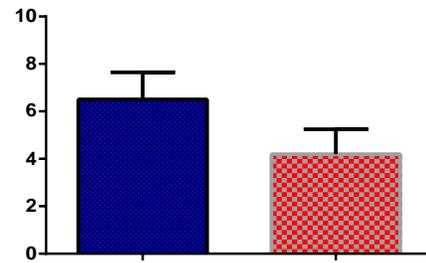


Fig. 4: VAS for ICT pre & post treatment.

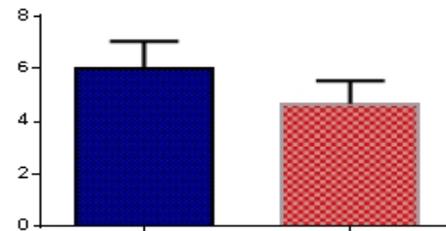


Fig. 5: post treatment NDI difference between TENS v/s ICT.

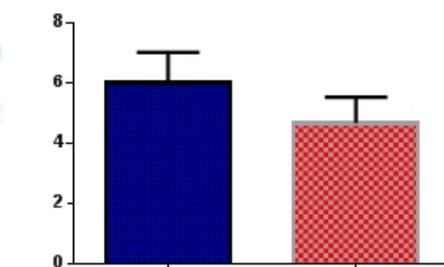
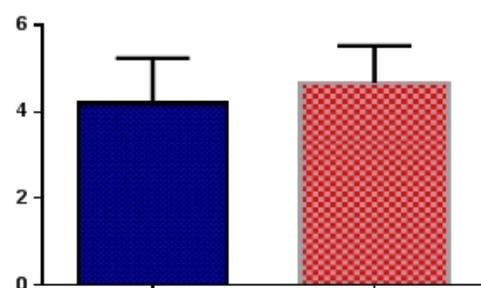


Fig. 6: Post treatment VAS difference between TENS v/s ICT.



DISCUSSION

Most of the literature concentrates on neck pain in general & very few studies are available targeting on cervical radiculopathy. One of the most common protocols used for the managements of cervical radiculopathy is a combination of TENS & neck exercise, traction, hot fomentation, massage & intermittent Cervical traction have been used. In this study, 18 females (60%) & 12 (40%) males are involved.

This study shows that "cervical radiculopathy is mostly seen in housewives & computer workers than the drivers and policemen due to prolonged static posture and poor ergonomics.^{13,14} The results of this study revealed that both groups demonstrated a highly significant improvement in reducing pain as measured by VAS ($P < 0.05$) & decreasing neck disability & improving functional activities as measured by NDI ($P < 0.05$). Further it showed that, the reduction in pain & neck disability is significant more in the TENS combined with Isometric Neck Exercise & active movements when compared against the Intermittent Cervical Traction group.

The highly reduction in the pain could be due to the analgesic effects of TENS. In TENS pain gate theory work. The possible mechanism of non-acute pain relief by low rate TENS at motor level stimulation is peripheral block or activation of central inhibition. The induction of rhythmic contraction may also activate the endogenous opiate mechanisms of analgesia⁷. It gives best results in shorter duration.⁷ Young et al. (2009) examined the effects of manual therapy & exercise, with or without the addition of cervical traction, on pain, function & disability in patients with cervical radiculopathy. The results suggest that the addition of mechanical cervical traction to a multimodal treatment program of manual therapy and exercise yields no significant addition benefit to pain, function, or disability in patients with cervical radiculopathy.⁵ Subhas Chandra Rai et al stated that even though TENS and neck exercise are effective, the addition of intermittent cervical traction with TENS and exercise is even more effective in the management of cervical radiculopathy and that ICT should have a place in the management of cervical radiculopathy.⁷

Graham N et al stated that 'The current literature does not support the effectiveness of ICT for pain reduction, improve function. Conservative treatment which include TENS, neck strengthening exercise are more effective than that.¹¹

The mechanism by which ICT reduces neck & arm pain is possibly by unloading the components of the spine by stretching muscles, ligaments & functional units, reducing adhesions within the dura sleeve, nerve root decompression

within the central foramina. But in intermittent cervical traction patient is not aware of hold and rest period. So patient contract his muscle. A little post treatment muscle soreness in the neck is common, but too much soreness or an increase in peripheral symptoms is a sign that the force may have been increased too quickly.^{12,13}

A common problem from administering cervical traction when using a head halter is aggravation of the temporomandibular joints because of the force applied at the chin.^{14,15,16} With advancing age, the tissues become more susceptible to disruption & joint trauma, which, in some cases, may be irreversible. Cervical traction should be carried out with caution^{15,16,17}. In the older patients particularly, excessive pressure on the jaw can lead to intracapsular bleeding & hematoma in the temporomandibular joint.¹⁵

CONCLUSION

From the above study it can be concluded that TENS was more effective in the management of cervical radiculopathy along with INE, in reducing both neck & arm pain, neck disability & in improving activities of daily living.

Limitations of Study

Study was done on small sample size and objective measures were limited

Abbreviations

TENS- Transcutaneous Electrical Nerve Stimulation

ICT-Intermittent Cervical Traction

INE-Isometric Neck Exercise

VAS-Visual analog scale

NDI-Neck Disability Index

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Conflicts of interest: None

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