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## **A COMPARISON ON TRANSCUTANEOUS ELECTRICAL AND NERVE STIMULATION APPLICATION IN REDUCING POSTURAL NECK PAIN**

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### **INTRODUCTION**

Spondylosis is a Greek word-meaning vertebra. Cervical Spondylosis is a non- specific term describing the morphological manifestations of progressive degeneration of the spine. Cervical spondylosis is a disorder caused by abnormal wear on the cartilage and bones of the neck (cervical vertebrae) with degeneration and mineral deposits in the cushions between the vertebrae (cervical disks) and there is subsequent impingement of neural elements in a narrow cervical canal. Some authors also include the degenerative changes in the facet joints, longitudinal ligaments, and ligamentum flavum. The changes result in neural compression resulting in radiculopathy or compression of the spinal cord resulting in myelopathy. Both the neural and spinal cord compression will result in radiculo myelopathy

Due to aging intervertebral disc undergoes progressive desiccation, becomes more compressible and less elastic and secondary changes ensue Spondylosis progresses with age and often develops at multiple interspaces. Chronic cervical degeneration is the most common cause of progressive spinal cord and nerve root compression. 30-40% of the population above age 40 years. Symptoms of cervical spondylosis may appear in those as young as 30 years and are most commonly in those aged 40-60 years. It is the most common cause of spinal cord dysfunction in patients older than 55 years. Radiological Spondylotic changes increase with patient age. On the basis of radiologic findings, 90% of men more than 50 years and 90% of women older than 60 years have evidence of degenerative changes in the cervical spine. Both sexes are affected equally Cervical spondylosis usually starts earlier in men than in women There are several predisposing factors, which may cause acceleration of these changes.

► Occupations: requiring repetitive motion of the cervical spine.

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- ▶ Previous injury with fracture or disc prolapse
  - ▶ Segmentation defects like hemi vertebra or fused vertebrae

Intervertebral disks lose hydration and elasticity with age, and these losses lead to cracks and fissures. The surrounding ligaments also lose their elastic properties and develop traction spurs. The disk subsequently collapses as a result of biomechanical incompetence, causing the annulus to bulge outward. As the disk space narrows, the annulus bulges, and the facets override. This change, in turn, increases motion at that spinal segment and further hastens the damage to the disk. Annulus fissures and herniation may occur. Acute disk herniation may complicate chronic Spondylotic changes. As the annulus bulges, the cross-sectional area of the canal is narrowed. This effect may be accentuated by hypertrophy of the facet joints (posteriorly) and the ligamentum flavum, which becomes thick with age. Neck extension causes the ligaments to fold inward, reducing the antero posterior (AP) diameter of the spinal canal. As disc degeneration occurs, the uncinat process overrides and hypertrophies, compromising the ventrolateral portion of the foramen. Likewise, facet hypertrophy decreases the dorsolateral aspect of the foramen. This change contributes to the radiculopathy associated with cervical spondylosis. Marginalosteophytes begin to develop. Additional stresses such as trauma or long-term heavy use may exacerbate this process. These osteophytes stabilize the vertebral bodies adjacent to the level of the degenerating disk and increase the weight-bearing surface of the vertebral endplates. The result is decreased effective force on each of these structures. Degeneration of the joint surfaces and ligaments decreases motion and can act as a limiting mechanism against further deterioration. Thickening and ossification of the posterior longitudinal ligament (OPLL) also decreases the diameter of the canal. The blood supply of the spinal cord is an important anatomic factor in the pathophysiology. Radicular arteries in the dural sleeves tolerate compression and repetitive minor trauma poorly. The spinal cord and canal size are also factors. A congenitally narrow canal does not necessarily predispose a person to myelopathy, but symptomatic disease rarely develops in individuals with canals larger than 13 mm.

Common clinical syndromes associated with cervical spondylosis include the following: pain

Chronic sub occipital headache may be present Mechanisms Cervical pain. Chronic direct nerve compression; degenerative disk joint, or ligamentous include direct nerve ions and segmental instability. Pain can be perceived locally, or it may radiate the occipital, shoulder, scapula, or arm. The pain, which is worse when the patient is in certain positions, can interfere with sleep Cervical radiculopathy. Compression of the cervical nerve roots leads to ischemic changes that cause sensory dysfunction (e.g. radicular pain) and/or motor dysfunction (e.g., weakness). Radiculopathy most commonly occurs in those aged 40-50 years. An acute herniated disk or chronic Spondylotic changes can cause cervical radiculopathy. The C6 root is most commonly affected because of the predominant degeneration at the C5-C6 interspace, the next most common sites are at C7 and C5. Management of cervical spondylosis patient can be done by various treatments. Medical treatment Usually analgesics & muscle relaxants are advised. In more severe cases the orthopaedic doctor may suggest cortisone injection near the Joints of vertebral bodies to ease the swelling of nerves & relieve pain. Surgical treatment If medical & physiotherapy treatment fails & condition is severe, where the nerves are affected, surgery may be required. decompression of the nerve is done to relive the pain which is compressed by the bones & disc. Physiotherapy treatment the goal of physiotherapy treatment is to relieve ain & enhance movements of neck. There are various treatment options in physiotherapy like, TENS, cervical traction, postural correction of patient.

### **STATEMENT OF THE STUDY**

A comparative study of TENS and Traction for the treatment of cervical spondylosis.

### **AIM AND PURPOSE OF THE STUDY**

The aim of this study is to compare the effectiveness of TENS and TRACTION in patients with cervical spondylosis. Cervical spondylosis patients were given both TENS & cervical traction frequently. So, I was curious about which one of them gives better results in patients of cervical spondylosis. To conduct a comparative evaluation of TENS and Traction in Cervical spondylosis. Aim is to find out whether TENS or TRACTION is effective in Cervical Spondylosis.

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- To relieve pain
  - To compare effectiveness
  - To prevent further progression
  - To limit complications associated with this condition
  - To regain the lost functions of Cervical spine
  - To maintain range of motion
  - To relieve patient from depression by improving their ADL.
  - To make people aware that there are Physiotherapy technique can prevent them from being deformed and regain their lost Movement of Cervical spines

### **SIGNIFICANCE OF STUDY**

There is rush of sedentary work in daily life which cause excessive stress on cervical region due to bad posture and also results in neuronal involvement. Here electrotherapeutic modalities along with other form of treatment reduces pain. Other important thing is that this study signifies whether TENS and Interferential therapy is effective or not in this condition.

### **HYPOTHESIS**

#### **NULL HYPOTHESIS**

TENS and Traction both are ineffective in treatment of cervical spondylosis

#### **ALTERNATE HYPOTHESIS**

TENS is effective than TRACTION in treatment of cervical spondylosis.

### **OPERATIONAL DEFINITIONS**

#### **CERVICAL SPONDYLOSIS**

It is a degenerative, osteoarthritis, of the cervical vertebra and related tissues. It may cause pressure on nerve roots with subsequent pain and parasthesia in the limbs.

#### **TENS**

It stands for Transcutaneous Electrical Nerve Stimulation. It is the application of a pulsed rectangular wave via surface electrodes on the patient's skin.

#### **TRACTION**

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Traction is separating of two structures. Traction applied to the cervical spine by apply a force to the lift the head or a mobilization techniques to distract individual joint of the vertebra.

### **REVIEW OF LITERATURE**

According to Han Js, Chen X H, Yuan et al (1994), 32 patients with cervically originated muscle Spasm were treated with TENS. It was seen that the patients with TENS were showing good progress after 3 months. TENS was given everyday for 10 min, 0.8 intensity with pulsed mode.

1. According to Wright, et al(2003) studied the evidence for each main categories of TENS, mobilization in management of musculoskeletal pain in cervical spondylosis patients. They allocated 12 patients and 6 being given TENS & 6 were given mobilization for 1 month, daily for 7min. After the completion of study it showed the therapeutic evidence of better result with TENS.
2. According to Person I C, Carlsson et al(2006) 81 patients with cervical pain of at least 3 months duration. Therapeutic effect evaluated with respect to pain, intensity, by VAS. The measurements were performed before treatment (control1), shorter after treatment (control2) & after further 12 months, control less pain (VAS), finally it was concluded that TENS is equally effective as that of surgery
3. According to Akyuz, Guvenez et al(1995) who have analyzed index finger, wrist segment median nerve sensory potential and recording obtained from C, before TENS and at 5, 10.15, min. of TENS application of 14 adult healthy Volunteers, results reflect selective stimulation of diameter fibre. According to Rogger Scudds et al(1983) with high frequency TENS the current intensity should never go beyond the comfort level i.e. low intensity. This will activate large fibers and close the gate in dorsal horn, the effect of high frequency TENS appears quickly after the on stet of stimulation but also disappears reap idly after the cessation of stimulation. This indicates that a neural mechanism is active. High frequency TENS is used most after to modulate acute pain. ACC. To him, stage frequency dosage for. Acute high frequency > Daily x 3-20min, Sub acute high Frequency-> Daily x 1-30 min.

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4. According to Prof. Kintoma TAKAURA(2003) TENS for relieving pain, the effect of pain relief by this method observed by a study group in united states(25), 47 cases (68%) out of 71 cases suffering from chronic pain were relieved the pain at least more than 50%. Lurson. Etal. (26) Inserted transcutaneously electrodes into the extra dural space to stimulate the dorsal column, is cases out of 18 cases suffering from stubborn pain were alleviated their pains. The effect sustained for several hours even after current had been turned off.
  5. According to Pagina 637 et al the effectiveness of traction and electroaccupunture for treatment of nerve-root type cervical spondylosis. 60 cases are studied in each group. There is therapeutic effect and improvement of pain for cervical spondylosis by traction is  $p < 0.05$ . But electro acupunture is more effective than traction. According to Akinbo SR, Noronha 17066112, the effects of different Cervical According to Akinh the effect of different cervical traction weights on neck pain and mobility. Ninety subjects were taken in three groups Cervical traction weight taken, 7.5% Total body weight, 10% Total body weight & 15% Total body weight. There was no significant difference( $p < 0.05$ )pre-treatment. In this study established the 10% Total body weight Cervical traction therapeutic efficacy.
  6. According to GJ van der Heijden, AJ Beurshkens et al (1995), purpose who conducted a systematic analysis to assess the efficacy of traction for patients with neck pain. In this subjects were taken for comparing traction with other treatments. There is no clear conclusions due to methodological flows in design & conduct However there no clear indications that traction is an ineffective therapy for neck.
  7. According to Martinez - Segura et al (2006), the immediate effects on neck pain & active cervical range of motion after a single cervical high-velocity low amplitude manipulation in seventy patients wit mechanical neck pain Within group changes showed a significant improvement in neck pain at rest & mobility after application of the manipulation & both lateral flexion extension & both lateral flexions but not in rotation. The greater the increase in neck mobility, the less the pain at rest.
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8. According to Shakoor et al(2002), who conducted a study to find out effects of cervical traction & exercise on patients with chronic cervical spondylosis. A total 199 patients were treated, 100 with cervical traction & exercise & 99 patients treated with NSAIDS. Posture correction advice was given to all patients. After 6 weeks, there was a marked improvement in both groups. But there was nearly significant difference regarding improvement in treatment with cervical Traction plus exercises than with NSAIDS. So, cervical traction & neck muscle strengthening exercises may have some more beneficial effects than NSAIDS on Chronic cervical spondylosis.
9. According to Akinbo, Noronha et al(2006), the effect of cervical traction on Cardiovascular system of cervical spondylosis patients using various weights. They divided patients in 3 experimental groups, in first 7.5% kg TBW, in second 10 % kg TBW & in third 15 % kg TBW. Cardiovascular alterations do occur During application of cervical traction weight resulting in untoward patients Reaction. The heart rate revealed no significant difference in all the groups, these Results signified that cardiac muscles were not adversely affected by any of the Traction weight during application.

### **NATURE OF THE STUDY**

It is a comparative study to check the effectiveness of TENS and Traction for the treatment of cervical spondylosis.

### **RESEARCH SETTING**

The research is carried out in the research laboratory of Gaur Brahaman Ayurvedic & Physiotherapy College with permission.

### **CONSENT AND ETHICAL APPROVAL**

The Institute gave approval for this study. Each subject was examined by the Institute Medical Officer and was certified that they are physically and medically fit for this study. Consent was taken from all the subjects prior to the study.

### **SELECTION CRITERIA**

#### **Inclusion Criteria**

1. Cervical spondylosis patients with radiating and non-radiating pain.



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2. Subject between 30-55 years of age(both sexes).
  3. Subject who were willing to come regularly & abide by the instruction given for the purpose of the study.

#### **Exclusion Criteria**

1. History of upper limb injury
2. Any kind of fracture
3. Thoracic outlet syndrome.
4. Adhesive capsulitis.
5. Carpal tunnel syndrome
6. Brachial plexus neuritis.
7. Shoulder hand syndrome.
8. Rotator cuff lesions.
9. Cervical tumors.
10. Brown-sequard syndrome.
11. Diabetic neuropathy.
12. Subjects below 30 yrs age & above 55 yrs age.

#### **SAMPLE AND METHOD OF SELECTION**

A total of 20 subjects with age ranging from 30 years to 55 years diagnosed with cervical spondylosis were taken. Subjects were randomly assigned in 2 groups i.e. group A & group B. The method used for sample selection is Randomization of sampling design.

#### **VARIABLES OF STUDY**

##### **DEPENDENT VARIABLES**

**PAIN**

**ROM**

##### **INDEPENDENT VARIABLES**

**TENS**

**TRACTION**

##### **MATERIALS/INSTRUMENTS USED**

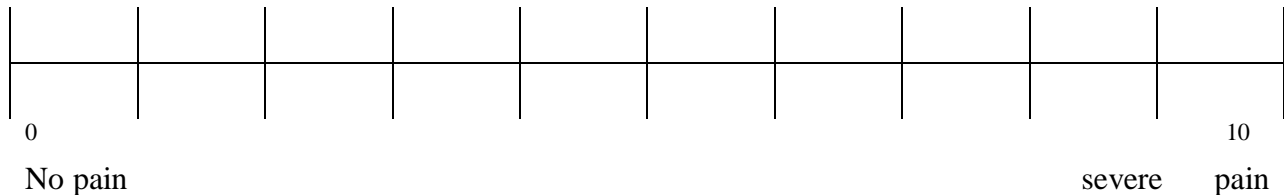
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### **VAS (Visual analog scale)**

VAS is a pain rating scale. Allows the patient visually gauge the amount of pain. Along a solid 10 cm line. Patient is asked to mark his/her pain status on the line provided



Examiner should consistently use the same pain rating scale when assessing or reassessing patient to increase consistent results.

TENS modality

Traction machine

Traction collar

Goniometer

Aqua sonic gel

Plinth

Stool

Wristwatch or clock

Visual Analog scale

### **METHODOLOGY**

#### **TENS**

#### **APPLICATION**

The patients were instructed to report any abnormal uncomfortable sensation while receiving TENS & any discomfort while performing cervical exercises. In group A TENS is given along isometric neck exercises. In TENS the arrangement of electrodes were changed according to tender point 2 electrodes were used in application of each treatment, contact is made using a liberal amount of Aqua Sonic gel. The electrodes are held securely on chosen site. During the application of TENS patient is in sitting position, then TENS was given in a Pulsed mode with ratio 1:1 for muscular parts, if bony 1:4, intensity used was 0.8 for 7 minutes duration 2 poles were selected for treatment.

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## **TRACTION**

### **APPLICATION**

The patients were instructed to report any abnormal uncomfortable sensation during application of traction. Cervical traction was given on supine lying position, the parameters for cervical spondylosis was as follows: 1/10 of total body weight, 20 seconds hold, 5 seconds rest, for 10 minutes.

### **VALIDITY AND RELIABILITY**

#### **INSTRUMENTAL VALIDITY**

**GONIOMETER** - Range of motion of shoulder joint was measured by universal goniometer. Goniometer is the preferred instrument for measuring range of motion. Smith & Walker demonstrated intra-tester reliability( $r = 90$ ) and inter tester reliability( $r = 70$ ).

#### **TENS**

The protocol for muscle contraction was induced with the help of TENS machine, which was standardized by the company Indian Medico Instrumentation, Delhi.

## **TRACTION**

TRACTION was applied with the help of TRACTION unit, which are a product of Indian Medico Instrumentation, Delhi, a reliable company in the field of physiotherapy equipment supply.

VAS Scale- it is always reliable

### **TESTERS RELIABILITY**

Procedure used for the measurement of the responses was conducted once and hence, this procedure was intra reliable

### **PROCEDURE RELIABILITY**

Procedure used in this study is reliable and was used previously by many researchers. The study consisted of two groups Group-A is the experimental group and Group-B is the control group with the age of 30-35 years and 10 in each group.

**Table-1**

**Comparison of pre and post treatment range of motion of group- A**

Sr. No.	Movement (in degrees)	Group-A	
		Pre (mean+- SD)	Post (Mean+-SD)
1	Flexion	29.5+-3.566	44.7+-2.668
2	extension	24.9+-2.601	38.8+-3.794
3	Left side flexion	9.9+-2.643	28.5+-4.6
4	Right side flexion	10.5+-1.509	30.4+-4.325

**Table-2**

**Comparison of the pre and post treatment range of motion of group-B**

Sr. no	Movement (in Degrees)	Group B	
		Pre (Mean+-SD)	Post (Mean +- SD)
1	Flexion	29.9+-2.846	40.4+-1.646
2	Extension	24.5+-3.1	33.1+-1.646
3	Left side flexion	9.4+-2.875	21.8+-2.74
4	Right side flexion	9.4+-1.641	22.0+-2.788

**Table-3**

Groups	Flexion (in degrees)	Extension (in degrees)	Right side flexion (in degrees)	Left side flexion (in degrees)
GroupA (mean+-SD)	44.7+-2.668	38.8+-3.794	28.5+-4.6	30.4+-4.325
GroupB (mean+-SD)	40.4+-1.646	33.1+-3.984	21.8+-2.74	22.0+-2.788

**Table-4**

**Comparison of pre and post treatment pain score of group A and B**

Groups	No. of subjects	Pre treatment	Post treatment
		(mean+-Standard Deviation)	(mean+-Standard Deviation)
GroupA	10	6.3+-0.9486	1.0+-0.666
GroupB	10	6.5+-1.08	2.2+-0.918

**Table-5**

Groups	No. of subjects	Post Treatment
		(mean+-Standard Deviation)
Group-A	10	1.0+-0.666
Group-B	10	2.2+-0.918

## **RESULTS**

This study was done on 30 patients grouped into two separate groups with 15 Patients in each

**Group-1** - patient are given only TENS

**Group-II**-Patient are given only TRACTION

From the study done, it is observed that TENS is effective in Cervical Spondylosis treatment.

Also, TENS is effective on the basis of Goniometer scale and visual pain analog scale

## **DISCUSSION**

The study has produced the following main findings:

- Group A which has received TENS showed 51.5% increase in cervical flexion, 55.8% increase in cervical extension, 187% increase in left sideflexion, 189% increase in right sideflexion and 84.1% decrease in pain score at VAS between pre and post intervention.
- Group B which has received CERVICAL TRACTION showed 35.11% increase in cervical flexion, 35.1% increase in cervcal extension, 131% increase in left sideflexion, 189% increase in right sideflexion 66.15% decrease in pain score at VAS between pre and post intervention.

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The effect of TENS can be explained on the basis that:

According to Taylor et al (1981). TENS is widely used as therapeutic modality to relieve pain. TENS reduces the pain by pain gate effect on both A-delta and C (slow) fibres in posterior horn due to stimulation of mechano-receptors (A-delta) morphine type effect on C-fibres system occurs. This is due to fibres. A morphalin produced by inter-neurons in the posterior horn. TENS blocks the enkephalin product. pathway and brings about relief of pain and improvement in range of pain pathway motion.

According to Mamm Heimer(1978), the placement of the electrodes is done at tender points.

The findings of this study is supported by other studies such as done by

According to Han Js, Chen X H, Yuan et al (1994), 32 patients with cervically originated muscle Spasm were treated with TENS. It was seen that the patients with TENS were showing good progress after 3 months. TENS was given everyday for 10 min, 0.8 intensity with pulsed mode.

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Therapeutic effect evaluated with respect to pain, intensity, by VAS. The measurements were performed before treatment (control1), shorter after treatment (control2) & after further 12 months, control less pain (VAS), finally it was concluded that TENS is equally effective as that of surgery According to Akyuz, Guvenez et al(1995) who have analyzed index finger, wrist seament median nerve sensory potential and recording obtained from C, before TENS and at 5, 10.15, min. of TENS application of 14 adult healthy volunteers, results reflect selective stimulation of diameter fibre. The effect of TRACTION can be explained on the basis that:

Traction is application of mechanical force to the body in a way that separates or attempts to

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separate joints surfaces and elongates the surrounding soft tissues. It is a mechanical device which supports head and chin and is used to relieve the nerve compression by a bony process. The incidence of cervical spondylosis can be traced to the degeneration of the disc which is considered to begin with the annulus as slight tears of the annular fibres. These tears apparently login in the vicinity of the nucleus, ascends, descends towards the end plates than migrate outwards. As the disc degenerates, the interdiscal pressure, decreases but the disc does not significantly, narrows. These leads to narrowing of intervertebral disc space and hence compress the nerves.

Alternate phases of stretching and relaxation produces effects of massage on muscular, ligamentous and capsular structures. Also, promotes circulation, reduces inflammation, spasm and pain.

The findings of this study is supported by other studies such as done by :

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According to Martinez - Segura et al(2006), the immediate effects on neck pain & active cervical range of motion after a single cervical high-velocity low amplitude manipulation in seventy patients wit mechanical neck pain Within group changes showed a significant improvement in neck pain at rest & mobility after application of the manipulation & both lateral flexion

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extension & both lateral flexions but not in rotation. The greater the increase in neck mobility, the less the pain at rest.

### **LIMITATION OF THE STUDY**

Less number of subjects was taken. Better statistical data can be obtained by taking more subjects.

2. Hypothetical assumption of the study.

3. Study was limited to small area that is physiotherapy department of G.B.A &P.C. I treat 30 patients in the department.

### **FUTURE SCOPE OF THE STUDIES**

Further study can include comparing this data to other electrotherapeutic modalities and other forms of treatments and looking at the effects obtained. Also asymptomatic and subjects at risk such as those with a history of trauma to the Cervical region such as falls or muscular pathological changes due to contusions or strains can be included.

To compare the Effectiveness of Laser Vs Stretching.

To compare the Effectiveness of Heat Vs Laser.

To study the combined Effectiveness of Stretching & splintage Vs TENS & Heat.

To study the Effectiveness of Ultrasound in the treatment of Cervical spondylosis

To Compare SWD with TENS.

To compare the Effectiveness of mobilization & SWD VS SWD alone in

### **Treatment of Cervical Spondylosis.**

To compare Laser Vs TENS in reducing the pain acute cases of Cervical Spondylosis

### **CONCLUSION**

Percentage increase in flexion range of motion in experimental group is 51.5% and in control group is 35.11%.

Percentage increase in extension range of motion in experimental group is 55.8% and in control group is 35.1%.

Percentage increase in Left sideflexion range of motion in experimental group is 187% and in



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control group is 131%.

Percentage increase in Right sideflexion range of motion in experimental group is 189% and in control group is 134%.

Percentage decrease in pain score in experimental group is 84.1% and in control group is 66.15%.

The findings of this study support the Alternate hypothesis that static TENS is more effective than cervical traction in improving the range of motion and decreasing pain in patients with Cervical spondylosis. Therefore it is suggested that TENS may be of therapeutic value in different clinical situations.

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