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# Effect of static erect neck pose in patients with cervical spondylosis-A randomized control trial

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**Abstract**
**Background:** Cervical spondylosis (CS) is a degenerative disorder starting in the intervertebral disc and progressing with age to involve more than one disc. Cervical spondylosis commonly affects the C5-C6 and C6-C7 levels of the cervical spine and can also result in high cervical spine lesions in some patients. According to the location and degree of spinal injury, the symptoms may vary in severity. The incidence rate of neck pain has been reported to wide, ranging from 0.4% to 86.8%. Those who have a higher risk of having neck pain are more likely to develop this condition. The sign and symptoms of CS include pain which may radiate or locate in the neck, limited movements in the neck, postural abnormalities, headache, paresthesia, and symptoms of vertebrobasilar insufficiency. In Cervical spondylosis there was reduction of joint space. So, traction directly helps in increasing the space which reduces the pain and increases range of motion effectively. There is less evidence available on self-traction for cervical spondylosis. So, this study was design to provide significant findings regarding erect neck pose and pain in patients with cervical spondylosis.
**Methodology:** A Randomized clinical trial was conducted for patients with cervical spondylosis. Purposive Sampling was done. Sample size was 54. Patients were randomly divided in to 2 groups. In group A conventional exercise along with static erect neck pose was given. In group B only conventional exercises were given. In group A patients were instructed to do static erect neck pose 4 times a day. Pain was assessed by NPRS before treatment, after 1st week of treatment, after 2nd week of treatment and after 4th week of treatment.
**Result:** Statistical analysis was done by using Jamovi version 2.3.28. Normality was tested first by Shapiro wilk test. Level of significance was kept 95% (p value was <0.05). So, further analysis was done by using non-parametric repeated measures ANOVA(Friedman)test. It shows there was difference in NPRS at 1st week,2nd week and 4th week. But according to mean of both the groups, in group A more improvement was obtained at 1st week,2nd week and 4th week.
**Discussion:** As traction results in increased joint space as well stretching of surrounding joint muscles, it should be included as a treatment along with conventional exercise. Mechanical traction can be given as treatment in clinical set up, along with that if patient performs selftraction by performing static erect neck pose better and clinical results can be obtain within less time duration compare to only conventional exercise.
**Conclusion:** Satatic erect neck pose can be given as adjacent treatment to conventional treatment as well as a home regime for early pain reduction in patients with cervical spondylosis.
**Limitation and Recommendations:** Only pain was assessed in this study. Other outcomes for e.g., Range of Motion, Neck Disability Index (NDI) can be assessed in further studies.

**Keywords:** Cervical spondylosis, neck pain, NPRS, self-traction

## Introduction

Cervical spondylosis (CS) is a degenerative disorder starting in the intervertebral disc and progressing with age to involve more than one disc [1]. It was the most common spine dysfunction in the elderly people which causes non-traumatic myelopathy, resulting in paraparesis and quadriparesis [2]. It is a degenerative disorder in the neck that is very common which worsens with age and can limit the ability to participate in normal activities [3]. This long-term degenerative disorder affects the spinal cord and nerve roots inside the spinal canal, as well as the vertebral bodies and intervertebral discs of the neck in the form of spur development and disc herniation. The ligamentum flavum, longitudinal ligaments, and facet joints are also affected by these changes [4]. Cervical spondylosis commonly affects the C5-C6 and C6-C7 levels of the cervical spine and can also result in high cervical spine lesions in some patients. According to the location and degree of spinal injury, the symptoms may vary in severity. The incidence rate of neck pain has been reported to wide, ranging from 0.4% to 86.8%. Those who have a higher risk of having neck pain are more likely to develop This condition [5]. CS is the common cause of neck pain. Neck pain also present the posture imbalance resulting from shortening and increased activation of sub occipital, sternocleidomastoid, upper trapezius, pectoralis and rotator cuff muscles [6]. The sign and symptoms of cervical spondylosis may appear in those as young as 30 years and are most commonly in those 40-60 years of age. When CS develops in a young individual, it was almost always secondary to a predisposing abnormality in one of the joints between the cervical vertebras probably as the result of previous mild trauma [7]. The sign and symptoms of CS include pain which may radiate or locate in the neck, limited movements in the neck, postural abnormalities, headache, paresthesia, and symptoms of vertebrobasilar insufficiency. These features may occur singly or in any combinations. Patients between the age of 40 to 49 years shows maximum prevalence of the disease which was more prevalent in males rather than females. The Indian population study shows 78% of radiological changes in cervical levels C5–C6 and C6–C7 [4]. Neck pain in CS was the most common symptom in the pure spondylytic period. It was often described as dull constant discomfort

which associates with neck stiffness. As the disease progress, patients may develop symptoms of radiculopathy Myelopathy [2]. Compression of an excited spinal nerve can cause radicular symptoms, which impact the nerve's distribution. Numbness, tingling, or burning pain in the dermatomal distribution that the specific nerve supplies are examples of sensory complaints. Additionally, patients may experience shooting pain, which originate in the neck and passes through the arm, via the fingers, and to the nerve's sensory distribution. If patients who do not have radiating pain at rest, it can frequently be provoked by extension movement of the neck, which further narrows the neural foramen. Motor weakness can also develop in the distribution of the specific nerve that was being compressed [2]. Usually getting worse, the degeneration can compress the cervical spinal cord or the exiting cervical spinal nerves. The biomechanics of spondylosis and the sequelae arising from it have been categorized into 2 broad categories. The term static mechanisms refer to the spondylytic alterations that progressively expand and may compress the spinal cord and spinal nerves. The spinal cord can also damage by dynamic mechanisms even when normal or abnormal movements occur [2].

Cervical spondylosis is often treated with a combination of conservative and surgical methods, with conservative treatment is the primary approach. Physical therapy has been demonstrated to a successful and effective treatment for cervical spondylosis in recent domestic and international studies, and it also enhances the quality of life for patients. As rehabilitation medicine continues to advance, new physical therapy techniques have been developed offering unique and recent advantages in the treatment of cervical spondylosis [5]. Available Medications are part of the medical therapy for the patients with cervical spondylosis. Non-steroidal anti-inflammatory medications (NSAIDs) are frequently used in the treatment of cervical spondylosis. Also, people with CS receive medical treatment with opioid analgesics, antidepressants, and muscle relaxants [8]. The majority of CS patients benefit from early surgical intervention. In the majority of CS cases, appropriate operative management leads to a good recovery. The operative treatment of degenerative cervical disorders has evolved over the past seventy-five years. Various operative procedures like a posterior approach, anterior procedures, cervical laminectomy, laminoplasty, anterior decompression and fusion techniques are used. Increasing familiarity with the anterior approach led to the development of multiple-level anterior reconstruction and instrumentation. The goals of operative treatment with all these techniques have been to prevent deterioration and, in some cases, to reverse the myelopathy by (a) decompressing the spinal cord, (b) stabilizing the spine in cases in which segmental motion may a contributory factor, and (c) secondarily improving cord perfusion by decompressing obstructed spinal vessels [9]. When combined with therapeutic exercises, manual physical therapy was an effective conservative treatment strategy for pain, joint limitations, and disability. In addition to improving function and decreasing discomfort, cervical traction when combined with manual physical therapy was an effective method to managing neck pain. Manual and Mechanical are the two different types of traction techniques commonly used [10].

When the traction was mechanical in nature and has certain applicability parameters that require further research, it was included in the evidence-based manual physical therapy management [10]. Traction techniques can used for the purposes of stretching the muscles and the facet joint capsules and widening the intervertebral foramina. The benefit of manual traction for the cervical spine was that the therapist can control the force application, head position, and hand placement. This allows the therapist to apply the force precisely and with the least amount of stress to areas that should not stretched [11]. In Cervical spondylosis there was reduction of joint space. So, traction directly helps in increasing the space which reduces the pain and increases range of motion effectively. There was less evidence available on self-traction for cervical spondylosis. By clinical observation I found that head reach outs give early beneficiary effect in context of pain in patients with cervical spondylosis and there was no evidence of giraffe neck pose in patients with cervical spondylosis. So, this study was design to provide significant findings.

## Methodology

**Study Design:** A Randomized clinical trial.

**Study Population:** Patients with cervical spondylosis.

**Sampling Technique:** Purposive Sampling.

**Sample Size:** Sample size was calculated on the basis of pilot study.

**Study Duration:** 1 Year.

**Study Setting:** Various physiotherapy OPD's of Surat city.

### Selection Criteria

### Inclusion Criteria

- Patients with cervical spondylosis [11]
- Both males and females [6]
- Participants who gave informed consent to participate in the study [11]
- Age between 30 to 60 years [7]
- Acute and chronic neck pain [12]
- Medically stable patients
- Diagnosed cases of CS [11]

### Exclusion Criteria

- Cervical trauma with fracture and dislocation [6]
- Rheumatoid arthritis [6]
- Osteoporosis [6]
- History of previous cervical surgery [6]
- Any in fectious disease of spine [6]
- Any in flammatory disease of spine [6]
- Any congenital deformity of cervical spine [6]
- Patients with prolonged steroid use [13]
- Tumor [13]
- Metabolic disease [7]

### Materials and Tools

- Consent form Paper and pen plinth
- Goniometer

### Outcome Measures

NPRS was used as an outcome measure in this study. Before treatment, At the end of 1st week of treatment, At the end of

2nd week of treatment and at the end of 4th week of treatment NPRS was taken.

**Procedure**

Ethical approval was taken from institutional ethical committee. Participants were preliminary screened based on inclusion and exclusion criteria. The purpose of the study was explained and a written informed consent was obtained from all the subjects. Demographic details and a baseline assessment were taken from the participants. They were randomly allocated into 2 groups, group A and group B by chit method.

**Group A:** Static erect neck pose +Subjects was undergoing conventional treatment

**Group B:** Subjects was undergoing conventional treatment

On the first day of the first week, baseline measurements of pain were taken by NPRS. Total treatment was of 5 times a week for 4 weeks duration. Post assessment data of pain by NPRS was taken at the end of 2nd week and at the end of the 4th week. To avoid bias among the patients, blinding was maintained. It was single blinded study.

**Study Intervention**

**Group A Static erect neck pose + conventional treatment.**

**Static Erect Neck Pose**

Patient was instructed to be in stool sitting/high sitting position. Patient was instructed to sit with erect trunk. Then patient was instructed to erect neck by erecting the cervical spine as if searching someone from crowd assuming like erect and extended giraffe neck. Patient was supposed to hold this erect neck pose statistically for 5 seconds. No forward head pose and additional trick/accessory movement was allowed. This exercise was repeated for 7 times in a single session. Patient was instructed to perform the same exercise at home 4 times other than the clinical session.

The conventional treatment for both the groups includes active range of motion (AROM) exercises of neck, cervical isometric exercises, shoulder bracing exercises, chin tuck exercise, stretching exercises and ICT.

**Results**

Data analysis was done by using Jamovi software version 2.3.28. Normality was checked by using Shapiro wilk test.

**Table 1:** Table of Normality

| | Group | Pre NPRS |
|---|---|---|
| Mean | 1 | 7.26 |
| | 2 | 7.00 |
| Median | 1 | 7 |
| | 2 | 7 |
| SD | 1 | 1.06 |
| | 2 | 0.920 |
| Shapiro-Wilk p | 1 | 0.002 |
| | 2 | 0.001 |

As Table 1 shows that p value by Shapiro wilk test is 0.002 for group A and 0.001 for group B. As the p value is < 0.05, further data analysis was done by using non parametric repeated measure ANOVA test i.e., Friedman test for both group A and group B.

**Table 2:** Repeated Measures ANOVA (Non-parametric) for Group A

| Fried man | | |
|---|---|---|
| $\chi^2$ | df | p |
| 77.5 | 3 | < .001 |

As Table 2 shows that p value is 0.001 by repeated measure ANOVA of group A, which is < 0.05. It indicates there is difference in NPRS between pre-treatment, end of 1st week of treatment, end of 2nd week of treatment, end of 4th week of treatment in Group A.

**Table 3:** Pairwise Comparisons (Durbin-Conover) for Group A

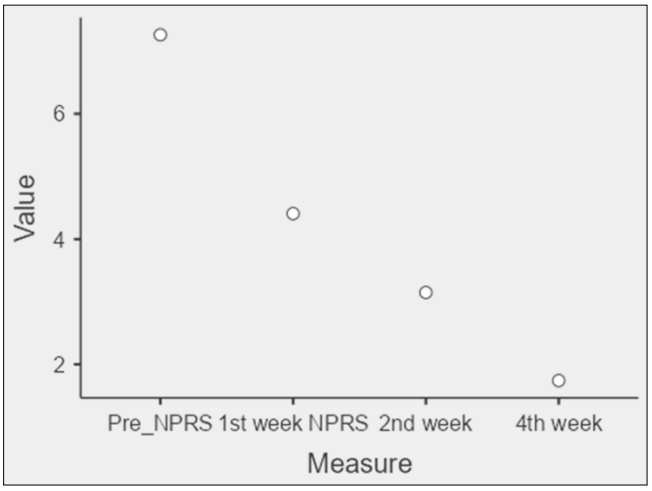
| Pairwise Comparisons (Durbin-Conover) | | | |
|---|---|---|---|
| | | Statistic | p |
| Pre_NPRS | 1st week NPRS | 14.6 | < .001 |
| Pre_NPRS | 2nd week | 27.2 | < .001 |
| Pre_NPRS | 4th week | 39.8 | < .001 |
| 1st week NPRS | 2nd week | 12.6 | < .001 |
| 1st week NPRS | 4th week | 25.2 | < .001 |
| 2nd week | 4th week | 12.6 | < .001 |

Table 3 shows individual pairwise comparison of NPRS for Group A. As the p value of each pair is 0.001, Which is <0.005.It indicates there is difference of NPRS among each pair.

**Table 4:** Mean NPRS of Group A at different time interval

| Descriptives | | |
|---|---|---|
| | **Mean** | **Median** |
| Pre_NPRS | 7.26 | 7 |
| 1st week NPRS | 4.41 | 4 |
| 2nd week | 3.15 | 3 |
| 4th week | 1.74 | 2 |

Table 4 shows mean of NPRS at different time interval. As we can see the NPRS is highest before treatment. It is grossly reduced at the end of the 1st week of treatment and gradually tapering with time. It is lowest at the 4th week of treatment.




**Graph 1:** Mean NPRS of Group A at different time interval

**Table 5:** Repeated Measures ANOVA (Non-parametric) for Group B

| Friedman | | |
|---|---|---|
| $\chi^2$ | df | p |
| 64.9 | 3 | < .001 |

As Table 5 shows that p value is 0.001 by repeated measure ANOVA of group A, which is < 0.05. It indicates there is difference in NPRS between pre-treatment, end of 1st week of treatment, end of 2nd week of treatment, end of 4th week of treatment in Group B.

**Table 6:** Pairwise Comparisons (Durbin-Conover) for Group B

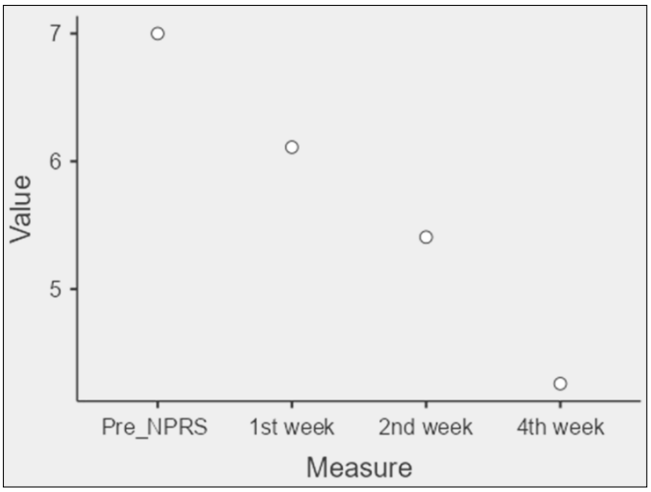
| Statistic P | | | |
|---|---|---|---|
| **Pre_NPRS** | **1st week** | **5.45** | **< .001** |
| Pre_NPRS | 2nd week | 9.88 | < .001 |
| Pre_NPRS | 4th week | 17.10 | < .001 |
| 1st week | 2nd week | 4.43 | < .001 |
| 1st week | 4th week | 11.66 | < .001 |
| 2nd week | 4th week | 7.22 | < .001 |

Table 6 shows individual pairwise comparison of NPRS for Group B. As the p value of each pair is 0.001, Which is <0. 005.It indicates there is difference of NPRS among each pair.

**Table 7:** Mean NPRS of Group B at different time interval

| | **Mean** | **Median** |
|---|---|---|
| **Pre_NPRS** | **7.00** | **7** |
| 1st week | 6.11 | 6 |
| 2nd week | 5.41 | 5 |
| 4th week | 4.26 | 4 |

Table 7 shows mean of NPRS at different time interval. As we can see the NPRS is highest before treatment and gradually tapering with time. It is lowest at the 4th week of treatment.




**Graph 2:** Mean NPRS of Group B at different time interval

**Discussion**

In present study total 54 patients were included. They were randomly allocated in to two groups. So, there were 27 patients in each group. In Group A Static erect neck pose along with conventional exercises were given and in Group B only conventional exercises were given. In Group A patient was instructed to perform erect neck pose exercise at home for 4 times a day. NPRS was taken as an outcome. Before treatment, at the end of 1st week treatment, at the end of 2nd week treatment and at the end of 4th week treatment NPRS was taken in both the groups. To avoid bias

among the patients, blinding was maintained. It was single blinded study. Total treatment was of 5 times a week for 4 weeks duration.

Table 1 shows that p value by Shapiro wilk test is 0.002 for group A and 0.001 for group B. As the p value is < 0.05, further data analysis was done by using non parametric repeated measure ANOVA test i.e., Friedman test for both group A and group B. Table 2 shows that p value is 0.001 by repeated measure ANOVA of group A, which is < 0.05. It indicates there is difference in NPRS between pre-treatment, end of 1st week of treatment, end of 2nd week of treatment, end of 4th week of treatment in Group A. Table 3 shows individual pairwise comparison of NPRS for Group A. As the p value of each pair is 0.001, Which is <0.05.It indicates there is difference of NPRS among each pair. Table 4 shows mean of NPRS at different time interval. As we can see the NPRS is highest before treatment. It is grossly reduced at the end of the 1st week of treatment and gradually tapering with time. It is lowest at the 4th week of treatment.

Table 4 shows mean of NPRS at different time interval. As we can see the NPRS is highest before treatment. It is grossly reduced at the end of the 1st week of treatment and gradually tapering with time. It is lowest at the 4th week of treatment. As Table 5 shows that p value is 0.001 by repeated measure ANOVA of group A, which is < 0.05. It indicates there is difference in NPRS between pre-treatment, end of 1st week of treatment, end of 2nd week of treatment, end of 4th week of treatment in Group B. As Table 5 shows that p value is 0.001 by repeated measure ANOVA of group A, which is < 0.05. It indicates there is difference in NPRS between pre-treatment, end of 1st week of treatment, end of 2nd week of treatment, end of 4th week of treatment in Group B. Table 6 shows individual pairwise comparison of NPRS for Group B. As the p value of each pair is 0.001, Which is <0. 005.It indicates there is difference of NPRS among each pair. Table 7 shows mean of NPRS at different time interval. As we can see the NPRS is highest before treatment and gradually tapering with time. It is lowest at the 4th week of treatment. So, this study concludes that both the groups are effective in reducing pain at the end of 1st week,2nd week and 4th week. But Group A is more effective compare to Group B. As mean NPRS of Group A before treatment was 7.26, at the end of 1st week 4.41, at the end of 2nd week 3.15, at the end of 4th week 1.75. NPRS of Group B before treatment was 7, at the end of 1st week 6.11, at the end of 2nd week 5.41, at the end of 4th week 4.26. So, it shows group A provides faster and better recovery.

As MCID of NPRS for neck pain is 1.5.[6] This study also shows that in Group A at the end of the 1st week clinically significant improvement is there compare to before treatment NPRS, but in Group B end of the 1st week there is no clinically significant improvement is there. This study also shows that in Group A at the end of the 2nd week clinically significant improvement is there compare to before treatment NPRS, but in Group B end of the 2nd week there is no clinically significant improvement is there. So, it represents that Group A provides pain recovery within 7 days of treatment where as in Group B there is no clinically significant pain recovery till 15 days.

This study shows that static erect neck pose provides better and early improvement in patients with CS. As Static erect neck pose promotes static stretch of the deep neck extensors muscles. The mechanical release is transferred to skeletal structure i.e., cervical vertebra. Which results in increased inter vertebral space. Which results in inhibition of nociceptors. So, pain perception is reduced [3-5]. Effectiveness of mechanical traction is already proven. But the traction machine is costly and which might not be affordable at every clinical set up as well as a home regime. So, static erect neck pose can provide the better alternative to mechanical traction as well as an alternative of other manual selftraction techniques. Hence the exact mechanism behind this technique can be studied in future along with the use of electromyography and other outcomes related to CS.

## Conclusion

This study concludes that static erect neck pose along with conventional exercise provides early and better pain reduction compare to conventional exercise alone.

## Limitations and further recommendations

- As in this study only 57 patients were taken, in future with larger sample the study can be done.
- Only NPRS was focused for evaluation of effectiveness, in future other outcomes can be analyzed
- The exact mechanism behind the pain relief within 1 week of treatment is not clear. So, further study can be done by EMG studies also.

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