

RESEARCH ARTICLE

Effects of TENS on Patient with Neck Pain due to Cervical Spondylosis

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Abstract

Background: Cervical spondylosis (CS) is a common age-related condition affecting the neck and shoulders due to degenerative changes. Risk factors include poor posture, anxiety, and aging, with prevalence increasing with age. Symptoms include neck pain, stiffness, numbness, and radiating pain. Neck pain affects 30–50% of the population yearly, often due to modern sedentary lifestyles. Transcutaneous electrical nerve stimulation (TENS) is a promising therapy for neck pain management, and it offers analgesic effects through nerve stimulation, but specific studies on its effectiveness and safety still need to be included for CS patients.

Aim of the Study: The study designed to evaluate the efficacy of TENS therapy in providing relief from neck pain among individuals diagnosed with CS.

Methods: A prospective observational study, a total of 100 patients with cervical spondylosis were assessed at two time periods, before and after the rehabilitation program. The study was conducted at the Department of Physical Medicine and Rehabilitation, in Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh, from January 2014 to June 2014. Inclusion criteria involved clinical and X-ray evidence of cervical spondylosis and subacute or chronic neck pain with limited mobility. Exclusion criteria included contraindications for electrotherapy and certain medical conditions. The rehabilitation program, conducted over ten days, followed the Declaration of Helsinki guidelines and included transcutaneous electrical nerve stimulation (TENS) therapy and various exercises.

Results: The majority of participants were over 60 years old (45%). Gender distribution showed 60% male and 40% female. Occupational composition revealed 45% employees, 25% retired, and 5% workers. Symptoms distribution showed equal occurrence on both sides (40% each), with 20% experiencing symptoms on both sides. Most participants (90%) did not use analgesics, while 10% used simple analgesia. After ten days, 75% showed improvement, 20% showed no change, and 5% worsened.

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Conclusion: The study highlights TENS efficacy in alleviating neck pain due to cervical spondylosis, especially among older individuals. Occupational factors and analgesic use patterns underscore the condition's complexity. After a ten-day TENS treatment, many patients experienced significant pain reduction, emphasizing its potential as a therapeutic option.

Keywords: TENS, Neck Pain and Cervical Spondylosis.

1. Introduction

Cervical spondylosis (CS) is a frequently encountered chronic condition associated with aging, characterized by degenerative alterations affecting the muscles, tendons, joints, and bones in the neck and shoulder region [1,2]. The etiological factors are heterogeneous and include poor posture, anxiety, depression, neck strain, and sporting activities [1,3]. The condition manifests in 25% of individuals below 40 years old, in 50% of those aged 40 and above, with the highest prevalence observed in individuals over 60 years old, where degenerative alterations are detected in 85% of cases. The cervical spine's more flexible lower segments, particularly C6-C7 and C5-C6, are more susceptible to involvement [4]. Primary symptoms typically include neck pain and stiffness, often accompanied by sensations of numbness and radiating pain extending into the shoulders, arms, and fingers [5]. Neck pain is defined as "perceived pain, originating in an area bounded above by the nuchal line, below by an imaginary line passing through the spinous process of T1 and laterally by the sagittal planes tangent to the lateral edges of the neck". Each year, neck pain impacts approximately 30–50% of the general population [6]. Neck pain is frequently linked to contemporary lifestyles characterized by prolonged periods of sitting, such as working on computers or watching TV, which can lead to strain in the cervical region and increased muscle stress [7]. Certain studies have identified a correlation between neck and arm pain and body positioning and posture during work activities [8,9]. Nevertheless, the primary risk factor is associated with age and degenerative alterations in the intervertebral discs and other cervical vertebrae [4]. Various treatments have been suggested for neck pain, ranging from pharmacological therapies like non-steroidal anti-inflammatory drugs, paracetamol, steroids, opioids, tramadol, muscle relaxants, psychotropics, anxiolytics, and hypnotics, to conservative approaches such as oxygen–ozone therapy [10]. In the rehabilitation process, physiotherapy treatment and instrumental physical therapies are frequently employed. Among these, transcutaneous electrical nerve stimulation (TENS) stands out with substantial

evidence of efficacy in managing neck pain. TENS offers various benefits including a chemical effect, vasodilation, analgesic effect, and thermal effect. It is considered one of the most widely utilized forms of analgesic electrotherapy, featuring symmetrical or asymmetrical rectangular waves, spike, continuous, or packet-burst modes. TENS impulses, characterized by their short duration, have the ability to selectively activate A beta fibers and hinder nociceptive impulses via the Gate-Control mechanism [11]. However, there is a lack of randomized controlled trials specifically aimed at investigating the effectiveness and safety of TENS for alleviating neck pain in patients with CS. We have designed this study to evaluate the efficacy of TENS therapy in providing relief from neck pain among individuals diagnosed with CS.

2. Methodology and Materials

This is prospective observational study, a total of 100 patients with cervical spondylosis were assessed at two time periods, before and after the rehabilitation program. The study was conducted at the Department of Physical Medicine and Rehabilitation, in Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh, from January 2014 to June 2014. To assess the results, a Visual analog scale (VAS), and a test range of motion in the cervical spine by goniometry were used.

2.1 Inclusion Criteria

- Patients with clinical and X-ray evidence of cervical spondylosis.
- Patients with subacute and chronic neck pain and limited mobility in the cervical spine.

2.2 Exclusion Criteria

- Patients contraindicated for electrotherapy, decompensated comorbidity, neoplastic diseases, pacemaker.

2.3 Treatment Procedure

The treatment was carried out as a course 10 days and the rehabilitation program was carried out in accordance with the instructions of the Declaration of Helsinki (1964) [12]. The rehabilitation program

included therapeutic interventions; TENS - transcutaneous electrical nerve stimulation. The electrodes were placed paravertebral. Anode - in the area of the most pronounced pain, cathode in transverse position. Biphasic mode of operation. Pulse duration 40 μ s. Frequency 100Hz, current intensity 5-15 mA depending on individual sensitivity, duration of procedure - 20 min. They are performed immediately after the electro procedure.

2.4 Measurement Procedure

Breathing exercises. Active isotonic, unforced exercises for the cervical spine and upper limbs. Exercises for the body and general developmental exercises. Exercises with equipment A visual analog scale (VAS) and a test range of motion in the cervical spine by goniometry was used to evaluate the results in two time periods before and after rehabilitation. The Visual Analog Scale (VAS), which is widely applied in different age groups was used to assess pain. VAS is a straight line from 0 to 10 cm (0 mm to 100 mm), at the beginning and the end, on which there are two descriptors representing extreme values of pain intensity (0- no pain and 10 extremely severe pain) at each end, 2 - mild pain, 4-moderate pain, 6-severe pain, 8-very severe pain. Patients themselves determine the level of their pain by placing a mark on the line. Range of motion in the cervical spine for sagittal, frontal and transverse planes, measured by goniometry in angular degrees.

2.5 Statistical Analyses

All data were presented in a suitable table or graph according to their affinity. A description of each table

and graph was given to understand them clearly. All statistical analyses were performed using SPSS version 26.0 (IBM SPSS Statistics). Continuous parameters were expressed as mean \pm SD and categorical parameters as frequency and percentage.

3. Results

Table 1 presents the age distribution of the study population where the majority of patients 45(45.00%) were aged over 60 years, 35(35.00%) of the patients fell within the 40-60 age range, and 20(20.00%) were under 40 years old. Figure 1 demonstrates the sex distribution of the study population; 60% of patients were male, and 40% were female. Table 2 provides insight into the occupational composition of the study population. The results reveal that 45(45.00%) participants were employees, followed by 25(25.00%) of retired and retired workers. Additionally, 5(5.00%) of the participants were workers. The distribution of Table 3 highlights the symptoms based on the side of the study population. The results indicate an equal occurrence of symptoms on both the left and right sides, with each accounting for 40(40.00%) of the cases. Additionally, 20(20.00%) participants reported simultaneously experiencing symptoms on both sides. Table 4 illustrates the distribution of analgesic use among the study population. The data indicates that most participants, comprising 90(90.00%) of the total, did not use any analgesic drugs. Conversely, only 10(10.00%) of participants reported using simple analgesia exclusively. The study outcome after ten days is shown in Table 5. 75(75%) of study patients were improved, 20(20%) had no improvement yet, and only 5(5%) had worse outcomes.

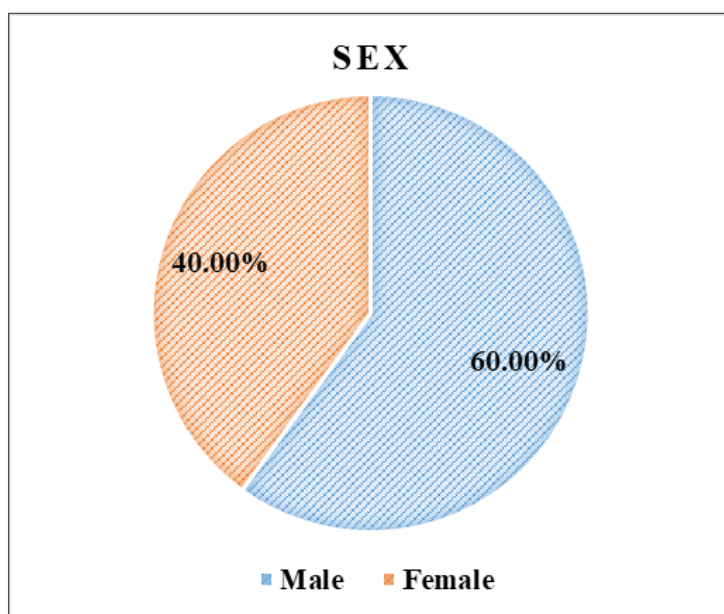


Figure 1. Sex distribution of the study population (N=100).

Table 1. Age distribution of the study population (N=100).

Age range (in years)	Frequency (n)	Percentage (%)
<40	20	20.00
40-60	35	35.00
>60	45	45.00
Mean±SD	55±8	

Table 2. Profession wise distribution of the study population (N=100).

Profession	Frequency (n)	Percentage (%)
Worker	5	5.00
Employee	45	45.00
Retired worker	25	25.00
Retired employee	25	25.00

Table 3. Symptoms distribution based on side (N=100).

Symptoms	Frequency (n)	Percentage (%)
Left	40	40.00
Right	40	40.00
Both	20	20.00

Table 4. Distribution of analgesic use on the study population (N=100).

Analgesic Intake	Frequency (n)	Percentage (%)
No analgesic drugs	90	90.00
Simple analgesia only	10	10.00

Table 5. Outcome of the study after 10 days.

variables	Frequency (n)	Percentage (%)
No improvement	20	20.00
Improvement	75	75.00
Worse	5	5.00

4. Discussion

Our preliminary investigation aimed to assess the therapeutic effects of TENS (transcutaneous electrical nerve stimulation) on neck pain in individuals diagnosed with cervical spondylosis. Most participants (45.00%) in our study were aged over 60 years, while 35 (35.00%) fell within the 40-60 age bracket. This demographic distribution aligns with findings from a related study where participants ranged from 33 to 73 years old [2]. Cervical spondylosis is more prevalent in older individuals due to natural aging processes and chronic wear on the cervical spine. With aging, degenerative changes occur in the neck's disks and joints, leading to spondylosis characterized by wear on cartilage and bones, often resulting in abnormal growths or spurs on the vertebrae [13]. Although aging is the primary factor, the manifestation of symptoms and functional impairments can vary depending on factors such as gender, profession, and the degree of degeneration, which are individualized for each patient [3]. Among

our study's 100 subjects, 60% were male and 40% were female, consistent with similar findings from another study [14]. Certain occupational factors, such as non-neutral neck postures, repetitive movements, or heavy lifting, can contribute to the development of cervical spondylosis. Additionally, prolonged periods in positions that strain the neck, like frequent tilting up or down, heighten susceptibility to this condition [15]. Our analysis revealed that 45.00% of participants were employed, followed by 25.00% who were retired, and five individuals (5.00%) were workers, echoing findings by Mratskova et al. [2]. Regarding pain symptoms, our study observed equal prevalence on both the left and right sides (40%). Only 10% of participants resorted to simple analgesia, consistent with observations made by Maayah and Al-Jarrah (2010) [14]. Following ten days of TENS treatment for cervical spondylosis, our study found that 75% experienced reduced neck pain, 20% showed no improvement, and only 5% reported worse outcomes,

corresponding with findings from another study [14]. TENS may stimulate large-diameter afferent fibers, potentially reducing the transmission of pain signals through tiny nociceptive afferent fibers, thus inhibiting pain discrimination and perception [16].

5. Limitations of the study

The limitations of this study primarily stem from its observational nature and the absence of a control group for comparison. As a prospective observational study, it cannot inherently establish causality between the TENS therapy and the observed outcomes. Furthermore, the short duration of the rehabilitation program, lasting only ten days, may not capture the full extent of TENS therapy's effects on neck pain in patients with cervical spondylosis.

6. Conclusion and Recommendations

In conclusion, our study demonstrates the promising therapeutic effects of TENS (transcutaneous electrical nerve stimulation) in alleviating neck pain among individuals diagnosed with cervical spondylosis. With most participants over 60 years, consistent with the condition's prevalence in older individuals, TENS treatment showed significant potential in reducing pain symptoms. Occupational factors and analgesic use patterns further underscored the multifactorial nature of cervical spondylosis. Following a ten-day TENS regimen, a substantial portion of patients experienced notable improvement in neck pain, indicating TENS' efficacy in managing this chronic condition. These findings highlight the importance of TENS as a viable therapeutic option for individuals suffering from cervical spondylosis-associated neck pain.

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7. References

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