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The efficacy of transcutaneous electrical neuro stimulation (TENS) in reducing pain in patients with cervical syndrome

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Abstract

Background: The cervical syndrome is a set of different symptoms that are located in and around the neck area. Physiotherapy and specifically electrotherapy through can help relieve pain in patients with cervical syndrome.

Aim: The aim of this review is to highlight, through recent articles, the efficacy of TENS in reducing pain in patients with cervical syndrome.

Method: The Google Scholar and PubMed databases were searched in English and Greek with the following keywords: cervical syndrome, Transcutaneous Electrical Nerve Stimulation, TENS, physiotherapeutic rehabilitation. Clinical studies and systematic reviews were included in the review.

Results: In total 10 sources were included in this review, of which seven were clinical trials and three were reviews.

Discussion-Conclusions: Applying TENS, either low-frequency or high-frequency, for 30 minutes with three sessions per week and duration of treatment varying from three to six weeks can effectively help reduce pain in patients with acute or chronic cervical syndrome.

Keywords: Cervical syndrome, transcutaneous electrical nerve stimulation, TENS, physiotherapeutic rehabilitation

Introduction

Spinal disorders are conditions that affect the cervical spine, which consists of the top seven vertebrae that surround and protect the spinal cord. The cervical spine contains many different anatomical compositions, including muscles, bones, ligaments and joints that have nerve endings and can detect adverse problems when they occur. These nerves provide muscle control and sensation to the skull and arms, and flexibility and movement to the body [1]. The cervical syndrome is a set of symptoms, the cause of which is located mainly in the occipital, cervical and shoulder area. However, it can also be found in other areas of the body, such as the head, chest and spine [2, 3].

Factors associated with the development or persistence of cervical syndrome are psychopathology, low job satisfaction, occupation or poor working environment, female gender, concomitant back pain or other rheumatic conditions, poor coping skills, trauma or previous neck injury, poor health, sedentary lifestyle, smoking and headache [4].

Significant heterogeneity is observed between epidemiological studies of cervical syndrome, which makes it difficult to compare or collect data from different studies. The estimated incidence of neck pain from the available studies ranges between 10.4% and 21.3% with a higher incidence in office and computer workers. However, there are studies that show that between 33% and 65% of people have recovered from an episode of neck pain in one year [5]. Most cases go through an episodic incidence in the life of an individual and, therefore, relapses are common. The overall prevalence of neck pain in the general population ranges between 0.4% and 86.8% with the annual prevalence ranging from 4.8% to 79.5%. Prevalence is generally higher in women, in high-income countries than in low- and middle-income countries, and in urban areas than in rural areas.

Furthermore, most studies show an increased risk of neck pain up to the age group 35-49 years, after which the risk begins to decrease [5, 6].

Physiotherapy plays an important role in treating neck pain. Transcutaneous Electrical Nerve Stimulation (TENS) is widely used in healthcare because it is cheap, safe and can be administered even by patients themselves [6, 7]. Moreover, TENS, as a physiotherapy device, has been compared for its effectiveness with other analgesic interventions and according to clinical research can relieve pain even in patients with cervical syndrome [8]. The aim of this review is to describe the efficacy of TENS in reducing pain in people with cervical syndrome.

Methods

The Google Scholar and PubMed were searched in English and Greek with the following keywords: cervical syndrome, Transcutaneous Electrical Nerve Stimulation, TENS, physiotherapeutic rehabilitation.

Results

This review included clinical trials and systematic reviews. Below are the main conclusions of the articles included in this review.

Literature review

Paolucci *et al.* [9] performed an umbrella review of systematic reviews to demonstrate the efficacy of TENS in patients with acute or chronic cervical syndrome. The studies they included used as an intervention method either low-frequency TENS (1-5Hz) or high-frequency TENS (60-100 Hz), for three weeks with treatment time varying from 10 to 30 minutes. The results of their review showed that TENS helps reduce pain regardless of the progress of the condition. However, further studies are needed to support this view.

In their trial, Debre *et al.* [10] investigated the effect of physiotherapy in patients with cervical myofascial pain. The study involved 90 participants aged 18-30 years, who were divided into three groups. The first group received TENS treatment, the second received exercises and the third group received friction massage. Treatment was performed three times a week for four weeks. Pain with the Visual Analog Scale (VAS) and the Neck Pain and Disability Index and level of depression with Beck's Depression Inventory was evaluated before and after intervention. This study results revealed no significant differences between the groups. All three groups showed a reduction in pain. The authors conclude that friction massage, exercise and TENS are equally effective interventions to manage neck pain.

Yesil *et al.* [11] investigated whether TENS and interferential current (IFC) increase the efficacy of neck stabilization exercises on pain, disability, mood and quality of life for chronic neck pain, either individually or in combination. A total of 81 patients with chronic cervical syndrome were divided into three groups (TENS group, IFC group and combination group). The intervention had a duration of weeks with 6- and 12-month follow ups. Pain intensity with the VAS, cervical range restriction (range of motion) with a goniometer, quality of life with the 36-item Short Form questionnaire, depression with the Beck depression inventory scale, disability with the Neck Pain and Disability Index and the intake of analgesics were evaluated before treatment and at the 6- and 12-week follow-ups. The findings of this study suggest that all three groups equally benefited from their respective treatment.

In another study, Martimbianco *et al.* [12] also attempted to

evaluate the efficacy of TENS in the treatment of cervical syndrome. Their review included randomized controlled trials involving adult patients with cervical syndrome (duration longer than 12 weeks). The main intervention used was TENS (60-100Hz) with a session duration of 20-60 minutes. The results showed a reduction in pain in patients with cervical syndrome, however, further studies are needed as the data found are of low certainty for the efficacy of TENS.

Regarding manual techniques, Khan *et al.* [13] studied the effects of massage and TENS in patients with cervical syndrome. There were 40 participants, who were randomly divided into two equal groups. Group A received 40-70Hz TENS treatment for 20 minutes and group B received massage for 30 minutes. Both groups had three sessions per week and a total of 18 sessions over a period of six weeks. At the end of six weeks, the results showed a significant reduction in pain but the efficacy of TENS was less compared to that of massage.

Chiu *et al.* [14] evaluated the efficacy of TENS compared to exercise and control in 218 individuals with chronic neck pain. The intervention had a duration of six weeks with a 6-month follow-up. Pain with the verbal numeric pain scale and the Northwick Park Neck Pain Questionnaire and isometric neck muscle strength were assessed before and after the intervention. The results of this study show that both TENS and exercise are equally effective in reducing pain in individuals with chronic neck pain.

In a different study, Park *et al.* [15] studied the effect of TENS in patients with cervical syndrome who have undergone thyroidectomy. Their study involved 100 patients: 50 in the group receiving 100Hz TENS therapy for 30 minutes and 50 in the control group. An 11-point scale was used to evaluate the interventions 30 minutes, six hours, 24 hours and 48 hours after surgery. The findings showed lower values on the scale and concluded that TENS can be used to reduce pain in patients with cervical syndrome after thyroidectomy.

Another study that concerned manual therapy was that of Escortell-Mayor *et al.* [16], who studied the efficacy of mobilization techniques and TENS in reducing pain in patients with cervical syndrome. The study involved 90 patients, of whom 47 received mobilization techniques for 30 minutes and 43 received 80Hz TENS for 30 minutes. The results were evaluated with the VAS, before and six months after the intervention. Therefore, no differences were observed between the two groups as both methods were analyzed in the short-term and found to help reduce pain.

Lastly, Maayah & Al-Jarrah [17] evaluated TENS as a treatment for cervical syndrome due to musculoskeletal disorders. The participants were 30 people with cervical syndrome, who were randomly divided into two groups and were given either treatment with 4-8Hz or placebo therapy. Each group received one session for one hour and the results were evaluated before and after the intervention with the myometer. The researchers found that TENS is an effective treatment for cervical pain due to musculoskeletal disorders. However, TENS showed pain relief in people with mild pain and not severe symptoms.

Discussion-Results

The results of this review show that TENS is used in painful conditions in which pain is the most common cause that directs patients to this therapeutic intervention. It is a modern form of analgesic electric current for pain management and is widely used by health professionals and especially by physiotherapists. Although the clinical efficacy of TENS is questionable for the complete recovery of pain, the current literature shows that

TENS contributes significantly to pain relief even in patients with cervical syndrome.

Applying TENS to a rehabilitation program in adult patients with cervical syndrome can help relieve pain. Specifically, the administration of TENS - either low-frequency 1-5Hz or high-frequency 60-100Hz, for 30 minutes of intervention, about three sessions per week, treatment period of 3-6 weeks - and the use of the VAS for pain assessment before and after each treatment can offer the best results in reducing pain in patients who experience mild or even severe symptoms. Therefore, TENS in combination with the VAS can improve pain in patients with cervical syndrome regardless of whether they are acute or chronic.

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