Original Article

Transcutaneous electric nerve stimulation: An adjuvant modality for pain relief in myofascial pain dysfunction syndrome

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Abstract

Background: Chronic facial pain owing to myofascial pain dysfunction syndrome (MPDS) remains a therapeutic problem. Multiple modalities have been used to manage this condition including pharmacotherapy, behavioral medicine, and corrective dental procedures.

Objectives: The objective of our study was to evaluate the efficacy of transcutaneous electric nerve stimulation (TENS) as an adjuvant to pain relief in myofascial pain dysfunction syndrome. Methods, 30 patients were treated with TENS therapy for three months.

Results: 28 patients out of the 30 had reduction in pain following TENS therapy. 2 among the 28 were completely relieved from pain. The mean reduction on the visual analog scale was found to be 4.5. 18 patients among the 21 patients who consumed analgesics pre-TENS therapy showed reduction in analgesic consumption post-TENS.

Conclusion: TENS is one of the many modalities for pain relief, and its role as an adjuvant modality in the management of MPDS is commendable.

Keywords
Gate control theory, myofascial pain dysfunction syndrome, pain, transcutaneous electric nerve stimulation

Introduction

Pain is the most common denomination that links the wide variety of diagnoses in the medical field. Management of patients with chronic pain often presents a challenge to the clinician, especially pain orofacial region. Few measures for management of chronic pain include utilization of analgesics, which either act centrally or peripherally and more invasive surgical techniques. Since the presentation of the Gate control theory proposed by Melzack and Wall in 1965, numerous studies have been conducted concerning the various methods for the treatment of pain based on the activation of afferent nerve fibers by electrical stimulation.[1] Transcutaneous electric nerve stimulation (TENS), a non-invasive non-surgical technique has been found to be an effective means of modulating pain. TENS is found to be efficient, safe, and a relatively simple treatment for chronic orofacial pain.[2] The TENS devices available today are ideal for home use by patients themselves. This arrangement allows patients to depend less on chemical pain relievers such as analgesics and narcotics, which can cause drug dependence, and not to mention the various side effects these medications cause. Hence, the purpose of this study is to assess the efficacy of TENS in chronic pain in the head and neck region for pain relief in chronic pain associated with myofascial pain dysfunction syndrome (MPDS) and determines its value as an accessory modality in pain relief for MPDS.

Materials and Methods

A prospective study was conducted at the Department of Oral and Maxillofacial Surgery in AB Shetty Dental College where 30 patients suffering from chronic pain owing to MPDS in the jaws, orofacial, and neck region were included in the study. Pain of odontogenic origin, post-operative pain, and neuralgias were excluded from the study. The patients having any contraindicating systemic conditions or were unwilling to commit to the program or follow-up were also excluded from the study. A complete medical evaluation was performed, and the procedure was explained to the patient. Informed consent was obtained from the patients. To quantify pain before and after treatment, visual analog scale (VAS) was used. VAS with a score of 0-10 was chosen, where extreme left from 0 was considered as no pain and the extreme right to 10 was considered unbearable
pain. To describe the pain intensity, patient had to choose a point on this scale. Each session of TENS lasted for 30 min. The TENS consisted of a short single electric pulse with duration of 0.3-0.5 ms, a frequency of 71 Hz for 84 ms at the rate of 2 Hz. The electrodes were placed at the trigger point areas on the temporalis and masseter by eliciting tenderness to palpation. The conducting carbon electrodes were placed bilaterally on the trigger points. The TENS unit was then switched on and the intensity was increased until the patient became aware of a sensation. The intensity was then decreased to subthreshold levels after which patient was treated for 30 min. The patients were treated 3 times a day for one week initially, and then, 2 or 3 times a week with checkups at regular intervals for 3 months. A threshold level was determined during each session to adjust the intensity to the subthreshold level at that particular appointment.

Results

Age and sex
Among 30 patients, 15 patients were males, and 15 patients were females (Graph 1). Most men were in the age range of 31-46 years and women in the age range of 26-65 years (Graph 2). The youngest patient was 26 years while the oldest was 65 years. The mean age for females was 58.5 years and for men was 54 years.

Intensity of pain before and after treatment as evaluated on VAS
Before the treatment, the intensity of pain varied between 4 and 8. After 3 months of treatment, the pain intensity varied between 0 and 5. The mean reduction in VAS score was 4.5. Two patients reported no change in the pain intensity on VAS.

Reduction in analgesics
21 (70%) patients took analgesics before the TENS treatment. During the treatment and post treatment, seven patients stopped analgesic usage completely. 11 patients were able to reduce the analgesics consumption, and three patients continued taking analgesics even after TENS therapy. The mean reduction in analgesics consumption was found to be 2 (Graph 3).

Discussion

The World Health Organization defines pain as “an unpleasant sensory or emotional experience associated with actual or potential tissue damage, or described in terms of such damage.” The objective of this study was to modify the pain secondary to MPDS because of its complex and variable nature.

A landmark study was conducted by Melzack and Wall in 1965 called the Gate control theory, which explained that both thin (pain) and large diameter (touch, pressure, and vibration) nerve fibers carry information from the site of injury to two destinations in the dorsal horn of the spinal cord namely transmission cells that carry the pain signal up to the brain, and inhibitory interneurons that impede transmission cell activity. Activity in both thin and large diameter fibers excites transmission cells. Thin fiber activity impedes the inhibitory cells, and large diameter fiber activity excites the inhibitory cells. Hence, the larger fiber (touch, pressure, and vibration) activity relative to thin fiber activity at the inhibitory cell, lesser the pain experienced.

Pain is best managed by a multimodality approach rather than any single modality. Different techniques have been proposed for facial pain management such as pharmacotherapy,
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which includes centrally/peripherally acting analgesics and anticonvulsants, physical therapy, behavioral medicine, and more invasive surgical techniques of alcohol blockade and thermocoagulation. These techniques are not without their usual side effects. Safer and newer techniques such as TENS and ultrasones have been introduced for management of chronic pain. TENS relieves pain by applying electrical impulses of variable frequency and wavelength transcutaneously through electrodes on the surface of the skin to produce local analgesia. Several theories have been put forth to explain the mechanism of TENS. The first theory, based on the innovative work of Melzack and Wall, suggests that TENS stimulates the thick, myelinated, and sensory fibers (A-fibers) which in turn blocks the impulses of thin pain-modulating fibers (C-fibers) and closes the gate to pain signals at their level of entry into spinal cord.\(^1\) Another theory suggests that there is an endogenous release of morphine-like substances, which have analgesic properties. A third mechanism of action is related to its ability to cause mild, rhythmic muscle contraction, which increases the local circulation of blood and lymph. This reduces the interstitial edema and accumulation of noxious tissue metabolites. TENS therapy works on several interrelated theories. TENS has been successfully applied in pain relief in post-herpetic neuralgias, peripheral nerve injuries, migraine, atypical facial pain, and MPDS.\(^3,4\) TENS therapy acts for a valid alternative to surgery when pharmacological therapy fails, especially in the elderly and in patients with atypical facial pain. MPDS, a common form of chronic facial pain is the broad concept of which was first described by Schwartz. An author stated that all patients with MPDS have the following three factors: (1) Compromised neuromuscular, skeletal, or dental tissues, (2) emotional stress, and (3) bruxism or clenching of the dentition (parafuction).\(^5\) Most of the participants in the present study were in the age group of 30-50 years. This is in accordance with several other studies where in MPDS has been found to occur in the third-to-fifth decades of life. In the present study, no definite gender predilection was evident. However, previous literature has reported female predominance. MPDS is more common in females as they are more likely to suffer from anxiety or stress. Treatment for MPDS is usually conservative, consisting of elimination of parafunctional habits such as grinding or clenching of teeth, physiotherapy, anti-inflammatory drugs, or a bite plate. The use of the TENS in the management of MPDS has been studied and documented by many authors. Kruger et al., in 1998 concluded that, in treating chronic pain conditions such as MPDS, the application of TENS has proved as an excellent adjunct modality. This is mostly due to the method directed at relaxation of masticatory musculature. This neuromuscular concept has been well supported by many authors.\(^5,6\) In our study, VAS was utilized for measurement of pain intensity due to its conciseness of scoring, conceptual simplicity, validity, and reliability. The sensitivity of VAS as a measurement technique has been demonstrated by several studies. TENS therapy reduced pain in 28 of the 30 patients. Among the 28 patients, two patients had complete relief from the pain. Most of the authors have reported an approximate 57% reduction in pain following TENS therapy in patients with MPDS. In our study, pain reduction was seen to be 51%, which is similar to precious literature. There was marked reduction in the consumption of analgesics. Only two among the 21 patients completely stopped consumption of analgesics. TENS can be used as an adjunct to conservative therapy of pharmacotherapy along with correction of parafunction and psychological evaluation.

Conclusion

Various means have been implemented for the reduction of pain. In our study, we found that TENS offers a modest, safe, and non-invasive technique, which has minimal, or no side effects. Proper use and monitoring would help the patients suffering from chronic pain the opportunity, to fully appreciate the scope of this small equipment. The greatest advantage of TENS is its ability to be used as an outpatient treatment. However, it requires a degree of patient initiative and motivation. TENS is one of the many modalities for pain relief, and a combination of which can be effective in treating the complex phenomenon of pain.

Clinical significance

Despite its extensive use and theoretical rationale, TENS in a clinical setting offers variable results. It is mostly important that a clinician should not assume that any particular pain may or may not respond to TENS as a wide range of chronic pain condition like MPDS has been successfully treated in our patients.

References
