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RESEARCH ARTICLE

APPLICATION OF TRANSCUTANEOUS ELECTRICAL NERVE STIMULATION THERAPY IN TEMPOROMANDIBULAR DISORDERS - A CLINICAL STUDY

***,[1]Kamala, K.A., [2]Sankethguddad, S., [2]Sujith, S.G. and [3]Praveena Tantradi**

[1]Department of Oral Medicine and Radiology, School of Dental Sciences, KIMSDU, Karad, Pin code -415110, District- Satara, Maharashtra, India
[2]Manjunath Dental Clinic, Above Hegade Medicals, Dharwad, Karnataka, India
[3]Department of Oral Medicine and Radiology, Maratha Mandal's Nathajirao G. Halgekar Institute of Dental Sciences and Research Centre, Belgaum, Karnataka, India

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ABSTRACT

Background: The use of transcutaneous electrical nerve stimulation (TENS) in dentistry was first described in 1967, by Shane and Kessler, but it has yet to gain widespread acceptance in dentistry. A study was undertaken to evaluate the effectiveness of TENS therapy as an adjuvant modality and to compare it with the conventional medication in controlling pain in temporomandibular disorder (TMD) patients.

Materials and Methods: A total of 60 patients with the clinical symptom of pain associated with TMDs were randomly divided into two groups. Group A (control) patients were treated with medication (analgesics and muscle relaxants) alone, while group B patients were treated with TENS therapy in combination with medication. The intensity of the pain was assessed using the Visual Analog Scale (VAS). The results were analyzed with the student's 't' test. A P-value < 0.05 was considered as significant.

Results: A significant improvement was observed in both the TENS and the control group in terms of pain control. On comparative analysis, adjuvant TENS therapy was found to be more effective than medication alone, in controlling pain. (P value = 0.019).

Conclusion: The observed data suggest that TENS therapy can be used as an adjuvant modality in the management of pain associated with TMDs. This study justifies the use of TENS therapy in the management of TMD.

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INTRODUCTION

Temporomandibular Disorders (TMDs) are defined as clinical problem involving the mascatory musculture, the Temporomandibular joint (TMJs), and associated structures and both. TMD is considered the most common musculoskeletal disorder that causes orofacial pain and frequently encountered in clinical practice. TMD affects up to 15% of adults, with a peak incidence at 20 to 40 years of age. (Wright and North 2009) The etiology of TMD is multifactorial and includes biologic, environmental, social, emotional, and cognitive triggers. . Common symptoms include jaw pain or dysfunction, earache, headache, and facial pain. Pain can be present at any stage of TMDs and is a significant part of the symptoms that prompt patients to seek treatment.

****Corresponding author: Kamala, K.A.,***
Department of Oral Medicine and Radiology, School of Dental Sciences, KIMSDU, Karad, Pin code -415110, District- Satara, Maharashtra, India.

Diagnosis is most often based on history and physical examination. Treatments for TMDs are wide-ranging and directed primarily toward relief from persistent orofacial pain. . Most patients improve with a combination of noninvasive therapies, including patient education, self-care, cognitive behavior therapy, orthopedic stabilization, intraoral appliances, placebo, and pharmacotherapy with analgesics, muscle relaxants, and antidepressants. (Gauer and Semidey, 2015) Current concept and recommended treatment for TMDs is Transcutaneous Electric Nerve Stimulation (TENS). It is a method of pain relief by the application of an electronic device, which produces pulsed biphasic electrical waves through the electrodes placed on the skin surface. FDA (Food & Drug Administration) has approved TENS as method of pin alleviation and classified it as class II device in 1972. (Kasat *et al*., 2014) During TENS therapy, pulsed electrical current is generated either by A.C. mains or using batteries [usually 9V] and delivered across the intact skin surface via electrodes to

Table 1. Evaluation of the gender distribution in the study

	No	%
Female	36	60%
Male	24	40%
Total	60	100%

Table 2. Evaluation of the sample distribution based on the clinical design

	Displacement with reduction n (%)	Displacement without reduction n (%)	Myosities & synuvitis n (%)	MPDS no (%)	Total no (%)
Group I	8 (26.67)	3 (10)	8 (26.67)	11 (36.66)	30 (100)
Group II	6 (20)	2 (6.67)	10 (33.33)	12 (40)	30 (100)
Total	14 (23.33)	5 (8.33)	18 (30)	23 (38.33)	60 (100)

Table 3. Evaluation of the pre-treatment and post-treatment NRS values

		Mean	n	Std. Deviation	Std. Error Mean
Group 1	Pre Medication	7.73	30	1.172	.214
	Post medication	3.23	30	.679	.124
Group 2	Pre Medication with TENS	8.27	30	1.112	.203
	Post medication with TENS	.97	30	.850	.155

Table 4. Comparison of Pain Reduction in Group I and Group II

Study group	n	Mean NRS values	Std. Deviation	Independent t-test
Group I	30	4.500	1.526	16.155
Group II	30	7.300	1.368	29.220

stimulate superficial nerves for localized pain relief. It is a safe, non-invasive, effective, and swift method of pain control. (Dhindsa *et al*., 2011) The main aim of this study was to assess the effectiveness of TENS therapy as an adjuvant modality and to compare TENS with the conventional medication and Physiotherapy in controlling the pain in the management of pain in TMD patients.

MATERIALS AND METHODS

The present study was carried out in the Department of Oral Medicine and Radiology, over a period of one year, on subjects reporting to the Dental Outpatient Department (OPD) Tatyasaheb Kore Dental College. Ethical clearance was obtained from the Ethical Committee, before the onset of the study. Informed consent was taken from all Patients. A total of 60 patients with a clinical symptom of pain associated with TMD were included in the study. Patients with a history of maxillofacial trauma, orofacial infections, and developmental anomalies of the maxillofacial region and patients with general contraindications of TENS (psychological disorders, cardiac pacemaker, epilepsy, pregnancy) were excluded from the study. The selected patients were randomly allocated into two equal groups. Informed consent was taken from all the patients before the start of the study. The patients in Group 1 were treated with jaw exercises, soft diet and pharmacotherapy (ultrazox tablet - chlorzoxazone 250 mg, diclofenac pattasium 50mg, paracetamol 325mg; manufactured by Ranbaxy Laboratories Ltd, Gurgaon, India) thrice daily, for seven days], while patients in Group 2 were subjected to TENS (TENS machine manufactured by Bharat Medical Systems, Chennai, India) therapy in two sessions of 30 minutes each, separated seven days apart, along with jaw exercises, soft diet and pharmacotherapy (ultrazox tablet - chlorzoxazone 250 mg, diclofenac pattasium 50mg, paracetamol 325mg; manufactured by Ranbaxy Laboratories Ltd, Gurgaon, India) thrice daily, for seven days.

The intensity of the pain was assessed using the Numerical Rating Scale (NRS) before and after the treatment and the values were recorded. All the data obtained from all the patients were subjected to statistical analysis. Student's paired and unpaired *t* tests were used. A *P* -value <0.05 was considered as significant.

RESULTS

In this study, all the 60 subjects were between the age ranges of 20 to 40 years. Out of the total 60 patients, 36 (40%) were females and 24 (40%) were males [Table 1]. In this study there were 14 cases of disk displacement with reduction, 5 cases of disk displacement without reduction, 18 patients with synovitis and myositis. There were 23 patients with Myofacial pain dysfunction syndrome (MPDS) [Table 2]. The mean pre-treatment numerical rating scale (NRS) value in Group I was 7.73 and the mean value for post treatment NRS was 3.23. The mean paired difference was 4.5 0 ± 1.52. The paired difference was statistically significant on the students paired *t* -test. The p-value was < 0.001. The mean pre treatment NRS value in Group II was 8.27 and the mean post treatment numerical scoring scale value was 0.97. The mean paired difference was 7.30 ± 1.36. The paired difference was statistically significant on the students paired *t* -test. The p -value was < 0.001 [Table 3]. The mean pain reduction (NRS value of the first visit – NRS value of the second visit) in Group I was 4.5 0 ± 1.52; while in the Group II it was 7.30 ± 1.36. These data were subjected to the student's independent *t*-test and the difference was statistically significant. The p- value was < 0.001 [Table 4].

DISCUSSION

Analyzing the results of our study, the age of the patients ranged from 20 to 55years. In this study, the maximum number

of patients were female, that is, 24 (60%) and 16 (40%) were male patients. This female predilection is consistent with the studies done by Jensen R *et al*., 1993 and Manfredini *et al*., 2010. Other studies have shown the highest prevalence among women of reproductive age, with the pattern of onset after puberty and lowered prevalence rates in the postmenopausal years, which suggests that the female reproductive hormones may play an etiological role in TMDs. (Warren MP and Fried JL 2001 and Nekora-Azak, 2004) Many authors have used Visual Analogue Scale (VAS) to assess the pain rate, but in our study we used Numerical Rating Scale (NRS) for the assessment of pain because of its superior results compared to VAS. (Ferreira-Valente *et al*., 2011) In our study, the mean pre-treatment NRS value in group 1 was 7.73 and the mean post-treatment NRS value was 3.23 and in group II was 8.27 and 0.97. The mean pain reduction (NRS value of the first visit- NRS value of the second visit) in group 1 was 4.5 0 ± 1.52; while in group II it was 7.30 ± 1.36. Statistical analysis showed that the difference in the mean pain reduction was significant, which implied that adjuvant TENS therapy was more effective than medication alone in relieving the pain associated with TMDs. This was similar to the observations drawn from many other studies. TENS has been used successfully in many other studies to alleviate chronic pain TMDs which were in consistent to our study.

Katch reported use of TENS to control pain TMJ syndrome in 10 year old girl and achieved 50-75% pain relief. Apart from 3 treatment cycles of 20 minutes each, patient used TENS along with ice massage at home to pain control. (Katch, 1986) Hansson and Ekblom studied effect of high frequencies [100Hz], low frequencies [2Hz] and placebo TENS for relief of acute orofacial pain in 62 patients who had suffered pain for 1-4 days. A decrease in pain intensity exceeding 50% was found in 38% of patients receiving either form of TENS, where only 10% of patients receiving placebo TENS experienced a pain reduction of more than 50%. (Hansson and Ekblom, 1983) Kato *et al*., 2006 conducted a study to evaluate effectiveness of TENS and low lever laser treatment (LLLT) in 18 TMD patients and found that TENS therapy significantly reduced pain and discomfort. Bassanta *et al*., 1997 conducted study on TENS therapy in 26 patients presenting signs of myofascial dysfunction, limited mouth opening and pain or tenderness in the temporalis and masseter muscles bilaterally and found that TENS therapy significantly reduced pain and discomfort. Rodrigues *et al*., 2004 carried out a study to evaluate the effect of TENS on pain in the jaw elevator muscles in 35 TMD patients and found that a single TENS application is effective in pain reduction. Rajpurohit *et al*., 2010 conducted a study to assess the effectiveness of TENS on the masticatory muscle pain in bruxism patients and found that TENS could be used as an effective pain-relieving modality in the treatment of masticatory muscle pain due to bruxism. In a study conducted on 45 patients with TMD, by Moger *et al*., 2011 found that TENS therapy helped in relieving pain, especially muscular and chronic pain. Rodrigues *et al*., 2004 conducted a case control study in 19 TMD patients and 16 normal subjects. Transcutaneous electrical nerve stimulation was applied once to each group for 45 minutes. Surface and VAS were applied before and immediately after TENS application. The TMD group, compared to the control group, showed higher EMG activity of the jaw elevator muscles at rest. No difference was observed between the groups regarding maximum voluntary clenching (MVC). In TMD patients, TENS reduced both pain and EMG activity of the anterior portion of the temporal muscle, increasing the activity of the masseter muscles during MVC. And the author concluded that a single TENS application is effective in pain reduction. However, our result was not consistent with that of some other studies. Alvarez-Arenal *et al*., 2002 conducted study on 24 patients with bruxism for evaluation the action of an occlusal splint with TENS in patients with bruxism. He concluded that the occlusal splint and TENS did not significantly improve the signs and symptoms of TMD in these patients with bruxism. Kruger *et al*., 1998 conducted a study to determine the effect of TENS plus conservative therapy (ibuprofen, bite plate, and self-physiotherapy) on myofascial pain dysfunction (MPD) and found that subthreshold TENS did not increase the symptom relief produced by conservative treatment. The difference in pain reduction in the above studies compared to our study could be attributed to the disparity between the samples with regard to differences in biological, psychological, and social components affecting the TMDs, as well as the stimulation parameters used in the TENS therapy. Apart from its analgesic effect, TENS can also be used to produce non-analgesic physiological effects and has been found to be beneficial in the management of dental treatment in pediatric and adult patients, trigeminal neuralgia, post-herpetic neuralgia, xerostomia Neurogenic, visceral pain, bruxism , acute and chronic pain, osteoarthritis and spinal cord nerve injury.

Conclusion

TENS therapy is only an initial symptomatic approach and not a definite means of managing the TMDs. It can be used as an adjuvant modality in controlling pain associated with TMDs and used in the management of a variety of conditions affecting maxillofacial region.

REFERENCES

Alvarez-Arenal, A., Junquera, L.M., Fernandez, J.P., Gonzalez, I. and Olay, S. 2002. Effect of occlusal splint and transcutaneous electric nerve stimulation on the signs and symptoms of temporomandibular disorders in patients with bruxism. *J Oral Rehabil.,* 29:858-63.

Bassanta, A.D., Sprosser, J.G. and Paiva, G. 1997. Estimulação elétrica neural transcutânea (TENS): sua aplicação nas disfunções temporomandibulares. Rev Odontol Univ São Paulo, 11:1-15.

Dhindsa, A., Pandit, I.K., Srivastav, N. and Gugnani, N. 2011. Comparative evaluation of the effectiveness of electronic dental anaesthesia with 2% lignocaine in various minor pediatric dental procedures: a clinical study. *Contemp Clin Dent.,* 2:27-30.

Ferreira-Valente, M.A., Pais-Ribeiro, J.L. and Jensen, M.P. 2011. Validity of four pain intensity rating scales. Pain 152:2399-2404.

Gauer, R.L. and Semidey, M.J. 2015. Diagnosis and Treatment of Temporomandibular Disorders. *Am Fam Physician,* 9:378-386.

Hansson, P. and Ekblom, A. 1983. Transcutaneous electrical nerve stimulation (TENS) as compared to placebo TENS for the relief of acute oro-facial pain. Pain, 15:157-65.

Jensen, R., Rasmussen, B.K., Pedersen, B., Lous, I. and Olesen, J. 1993. Prevalence of oromandibular dysfunction in a general population. *J Orofac Pain,* 7:175–82.

Kasat, V., Gupta, A., Ladda, R., Kathariya, Saluja H. and Ara Farooqui A. 2014. Transcutaneous electric nerve

stimulation (TENS) in dentistry- A review. *J Clin Exp Dent.,* 6:e562-e568.

Katch, E.M. 1986. Application of transcutaneous electrical nerve stimulation in dentistry. *Anesth Prog.,* 33:156-60.

Kato, M.T., Kogawa, E.M., Santos, C.N. and Conti, P.C. 2006. TENS and low-level laser therapy in the management of temporomandibular disorders. *J Appl Oral Sci*, 14:130–5.

Kruger, L.R., van der Linden, W.J. and Cleaton-Jones, P.E. 1998. Transcutaneous electrical nerve stimulation in the treatment of myofascial pain dysfunction. *S Afr J Surg.,* 36:35–8.

Manfredini, D., Piccotti, F., Ferronato, G. and Guarda-Nardini, L. 2010. Age peaks of different RDC/TMD diagnoses in a patient population. *J Dent.,* 38:392–9.

Moger, G., Shashikanth, M.C., Sunil, M.K. and Shambulingappa, P. 2011. Transcutaneous electrical nerve stimulation therapy in temporomandibular disorder: A clinical study. *J Indian Aca Oral Med Radiol.,* 23:46–50.

Nekora-Azak, A. 2004. Temporomandibular disorders in relation to female reproductive hormones: A literature review. *J Prosthet Dent.,* 91:491–3.

Rajpurohit, B., Khatri, S.M., Metgud, D. and Bagewadi, A. 2010. Effectiveness of transcutaneous electrical nerve stimulation and microcurrent electrical nerve stimulation in bruxism associated with masticatory muscle pain — a comparative study. *Indian J Dent Res.,* 21:104–6.

Rodrigues, D., Siriani, A.O. and Bérzin, F. 2004. Effect of conventional TENS on pain and electromyographic activity of masticatory muscles in TMD patients. *Braz Oral Res* 18:290–5

Warren, M.P. and Fried, J.L. 2001. Temporomandibular disorders and hormones in women. *Cells Tissues Organs,* 169:187–92.

Wright, E.F. and North, S.L. 2009. Management and Treatment of Temporomandibular Disorders: A Clinical Perspective. *Man Manip Ther.,* 17:247–254.

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