



The effect of TENS on temporomandibular joint clicking sound

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ABSTRACT

Introduction: Temporomandibular disorder (TMD) is a very common disorder in modern societies. This disease is caused by disturbance in the masticatory system and joints, leading to various symptoms such as pain, reduced maximum mouth opening, deviation, deflection and joint clicking sound. The clicking sound, which is a kind of joint sound, is one of the most important side effects of TMD. The present study was conducted to examine the effect of transcutaneous electrical nerve stimulation (TENS) on temporomandibular joint (TMJ) clicking sound.

Materials and Methods: Seventeen patients with TMD who had clicking sound were selected. The TENS unit was used for patients twice a week for ten sessions. The clicking sound in patients was recorded before and after the treatment. Data were analyzed using SPSS version 21 and McNemar's test.

Results: The results of the study showed that the average values of joint sound in the pretest was 1.000, and decreased to 0.647 in the posttest and this decrease was statistically significant ($p=0.031$).

Conclusion: TENS can be used as a therapeutic technique to reduce joint sounds.

Keywords: Clicking sound; Joint sound; Tens; Temporomandibular disorder.

Introduction

Temporomandibular disorders (TMDs) are a group of disorders that affect the masticatory system. Pain is known as the most dominant feature of this disorder. Understanding the cause of this disorder is very important since it affects the treatment approach [1]. TMD is the second most common musculoskeletal disorder and one of the most common chronic problems that leads to pain and discomfort in the orofacial area. Approximately, 75% of the population have multiple symptoms of TMD and 33% of them have at least one symptom [2-5]. One of the symptoms of TMD is jaw sound, which may

include Clicking, Crepitus and Popping. In many cases, joint sounds are not accompanied by pain and disturbances, and only cause discomfort in patients. However, they are sometimes accompanied by pain or jaw lock when opening and closing the mouth. Patients may even report sudden change in occlusion position [6]. Sound is a common finding in patients with temporomandibular joint disorders [7]. The jaw sound is symptom of temporomandibular joint disorder that should be taken into account in clinical examination.

However, regarding the examination of joint sound, patients with TMJ disc displacement and patients without TMJ disc displacement should be differentiated, since surgery is performed in severe cases of disk dislocation, while conservative treatment can be used in other cases. There is no general rule on how to detect and record sound in TMD because its diagnosis depends on auditory vibrations [8-11]. The causes of TMD are multifactorial and include habits, functional disorders, trauma, stress, genetics, and occlusal factors. Therefore, conservative and reversible treatment, especially in initial courses, is recommended [5,12].

Several treatments are recommended to control the pain and symptoms of TMD. Orthopedic fixation, intraoral devices, medications (analgesics, muscle relaxants, and antidepressants) and physiotherapy treatments are among these treatments. The aim of physiotherapy treatment is muscle relaxation, joint stability, and reduction of pain, swelling, spasm and inflammation. Massage, ultrasound, laser, and transcutaneous electrical nerve stimulation (TENS) are used to control the symptoms of TMD [13]. TENS is one of the tools used in physiotherapy. The TENS function is based on electrical stimulation through the skin [14]. The aim of this study is to evaluate the effect of TENS on joint sounds in TMD.

Materials and Methods

This study is a double-blind randomized clinical trial. The inclusion criteria were: suffering from TMD, pain severity of at least four for more than three months, age of 18-60 years, and having joint clicking sound. The exclusion criteria were: taking muscle relaxants and anti-inflammatory and sedative drugs within the last three month, pregnancy, history of trauma, and suffering from systemic diseases and trauma. Seventeen patients with temporomandibular joint clicking sound were selected from among patients who referred to School of Dentistry, University of Tehran. All patients provided written informed consent prior to their inclusion in the study. This study was approved by the Ethics Committee of Tehran University of Medical Sciences.

Before beginning the treatment, the patients' joint sound was recorded based on DC/TMD examinations [15]. Then, the TENS unit (iran novin, 615 k) was used for patients twice a week for ten sessions. A frequency of 150 HZ and a pulse width of 200 μ s were used. Four electrodes were placed on temporalis and masseter muscles. After ten sessions, the joint sound was

examined and recorded again. Since the joint sound was measured at nominal scale, McNemar's test was used in this study. The posttest score was compared with the pretest score using McNemar's test to determine whether any change occurred in the joint sound after the treatment.

Results

Overall, the mean (standard deviation) age was 36.13 years (9.591) with a minimum of 22 and a maximum of 60 years. Of the 17 studied patients, two patients (11.8%) were male and 15 patients (88.2%) were female. All samples were married (100%). Forty percent of these patients had Deviation and 13.3% of them had Deflection. As mentioned earlier, the existence of clicking sound was determined through examination in 17 patients in this study. Then, TENS therapeutic intervention was performed on them, and the joint clicking sound of these patients was recorded again in the posttest. As mentioned the joint sound was measured at nominal scale, McNemar's test was used in this study. The posttest score was compared with the pretest score using McNemar's test to determine whether any change occurred in the joint sound after the treatment. The McNemar's test results are shown in Table 1.

Variable	Step	Mean	Sd	P-Value	N
TMJ Sound	Before	1.000	0.000	0.031	17
	After	0.647	0.492		

Table 1. McNemar's test to evaluate the difference in between pretest and posttest regarding joint sound.

As shown in Table 1, the mean joint sound that was 1.000 in pretested decreased to 0.647 in posttest, and this decrease was statistically significant ($p=0.031$).

Discussion

The temporomandibular joint is located between the temporal bone of the skull and the mandible. Tmj includes mandibular condyles, articular disk, temporal fossa, muscles, and ligaments [16]. Temporomandibular disorders (TMDs) are a group of disorders that affect the masticatory system [1]. Complaints of patients with temporomandibular disorders can be associated with some musculoskeletal problems, anxiety and depression. Most patients report pain around the ears or face when opening the mouth or chewing. Sometimes these patients may have difficulty speaking [17].

The TMJ sound is an accepted symptom of TMD [18], which may include clicking, crepitus, popping, cracking, grinding, grating, and rubbing [6]. In addition to a clinical examination, electrovibratography and microphones can also be used to detect jaw sound [19,20]. Joint sounds are associated with joint disorders or myofascial pain disorder syndrome, which may be caused by orthodontics, trauma, surgery, and developmental disorders [21].

When the accumulated energy moves in front of the air or a solid object, it creates sound. Therefore, applying pressure to the meniscus may cause high-frequency vibrations. The peculiar shape, the way the components of joints are connected in the muscles and ligaments, and the presence of inflammation cause changes in vibrations and their speed [21]. TENS causes electrical nerve stimulation and reduces muscle spasm Through its electrodes, which are installed on the skin surface. Many mechanisms have been proposed to justify the effects of TENS. One of these mechanisms refers to direct stimulation of motor neurons. Stimulation of motor neurons cause rhythmic contractions in the muscles and, consequently, increased blood flow, decreased edema, muscle hypoxia and inflammation [22].

Seventeen patients with TMD who had clicking sound participated in the present study. Before the beginning of the treatment, the joint sound was detected based on the examinations. The TENS unit was used

for patients twice a week for ten sessions. The frequency of 150 Hz and pulse width of 200 μ s were used. We placed four electrodes on the temporalis, and masseter muscles. After ten sessions, the joint sound was examined and recorded again and it was observed that after ten sessions of using the TENS unit, the joint sound was significantly reduced. Khosla et al. (2015) showed that low-power laser therapy and TENS reduced sound and deviation, and low-power laser therapy was more effective than TENS [23].

In a clinical trial, Madani et al. (2011) selected 60 patients with temporomandibular disorder. The participants were randomly divided into three groups. Splint was used for the first group, physiotherapy was done for the second group, and both physiotherapy and splint were used for the third group. The splint was used by patients for at least 10 hours every night for three months. Ultrasound (2 W/cm², 3-5 minutes per week for four weeks) and TENS (100 Hz, 30 minutes per week for four weeks) devices were used in physiotherapy. They concluded that splint therapy is the best treatment method to reduce joint pain and sound in patients with TMD, and the splint performs better than TENS and ultrasound [24].

Peimani et al. (2018) carried out a study to evaluate the effect of drug and low-level laser therapy on temporomandibular disorders. Seventy two patients were divided into two groups. One group received Naproxen 500 mg and Diazepam 2mg twice a day for ten days, and the other group received low-level laser with wavelength of 808nm, power of 50 μ W and energy density of 144 j/cm² twice a week for four weeks. They found that the clicking sound reduced significantly after using drug and low-level laser [25]. Usage of TENS is very influential way for reduction of jaw sounds because it is relatively effective, safe, cost-effective and non-invasive method [22].

Conclusion

The transcutaneous electrical nerve stimulation (TENS) has significant effects on temporomandibular joint clicking sound and can be used as a therapeutic technique.

Conflict of Interest

There is no conflict of interest to declare.

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