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Evaluating the Effectiveness of Shortwave Diathermy on Tempromandibular Joint Disorders

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Abstract: **Objective: is to determine the efficacy of shortwave diathermy therapy for patients suffering from temporomandibular joint disorder.**
Methods: The study was performed on 32 patients with tempromandibular joint disorder. The patients were randomly divided into experimental and placebo groups. In the study group, the patients were treated with pulsed shortwave diathermy. The diathermy unit was with an operating frequency of 27.12 MHz. The unit houses a 200-cm2 induction coil with an air space plate of 2 cm. shortwave diathermy was performed using a direct skin contact for 15 minutes period. Each patient was given 3 treatment sessions per week over four weeks and a follow-up visit one week after treatment and again at 6 weeks. Effectiveness of shortwave diathermy was evaluated on pain and clicking in the groups.
Results: The pain severity at the end of treatment in the experimental group was 4.7 ± 1.6, which was significantly less than the placebo group's results of 6.8 ±1.5 ($p < 0.05$). Click reduction was 94.8% in the placebo group and 52.4% in the experimental group. The results were statistically significant for both pain and clicking without recurrence up to the 6 week follow-up period ($p < 0.05$).
Conclusion: Shortwave diathermy is an effective treatment for reducing pain and clicking associated with tempromandibular joint disorders.

Keywords: **Shortwave diathermy, Tempromandibular joint, Tempromandibular joint disorder.**

I. INTRODUCTION

Temporomandibular joint disorders are a collective term that embraces a number of clinical problems that involve the masticatory muscles, the temporomandibular joint, and the associated structures. [1- 3] Temporomandibular joint dysfunction is complex and its etiological factors are multiple and inadequately defined. It is most commonly reported in individuals between the ages of 20 and 40 years. The signs and symptoms of temporomandibular joint disorder are pain in the masseter muscle, temporalis muscle region associated with limitation of mouth opening, and temporomandibular joint sounds. Temporomandibular joint pain is by far the most common reason patients seek treatment. [4] Non-invasive therapies should be attempted before pursuing invasive, semi-permanent or permanent treatments (such as orthodontics or surgery) that have the potential to cause irreparable harm. [5-8] Pulsed shortwave diathermy therapy is a widely used modality. Shortwave therapy is the application of electromagnetic energy to the body at shortwave frequencies. At these frequencies the electromagnetic energy is converted to thermal energy by the induction of circulating currents in the tissue and dielectric absorption in insulating tissue. Shortwave therapy units may produce output power levels up to 500W providing significant heating to the area of the body being treated. For this reason the treatment is often called shortwave diathermy. The therapeutic effects are produced either through the generation of heat or by 'athermal' mechanisms. A review of the clinical trials on shortwave diathermy found it was indicated in a broad spectrum of conditions, although it is not known if it is used in all these conditions. [9] Details of conditions commonly treated by use of shortwave diathermy are useful as they enable

future clinical trials to be based on what has proved successful in clinical practice. In addition effective treatment is only possible when that treatment is administered safely, yet this area has largely been ignored. [10]

The main purpose of this study was determining the efficacy of shortwave diathermy therapy for patients suffering from temporomandibular joint pain and clicking.

II. MATERIALS AND METHODS

A single-blind clinical trial was conducted on 32 (16 male and 16 female) patients with temporomandibular disorders. None of them had degenerative joints, mental disorders, history of malignancy, or systemic diseases. Pregnant women and patients with cardiac pacemaker were also eliminated. The patients were randomly allocated into 2 equal groups: The first group received pulsed shortwave diathermy treatment. The diathermy unit was a Megapulse machine (Accelerated Care Plus, Sparks, NV) with an operating frequency of 27.12 MHz. The unit houses a 200-cm^2 induction coil with an air space plate of 2 cm. The unit was calibrated prior to the study. The second group was a placebo group. Shortwave diathermy was performed using a direct skin contact for 15 minutes period. Each patient was given 3 treatment sessions per week over four weeks and a follow-up visit one week after treatment and again at 6 weeks. Pain was evaluated using the visual analog scale (VAS). Zero denoted no pain and 10 denoted severe pain. Clicking was evaluated with a stethoscope. The difference between pain intensities and clicking before and after shortwave diathermy was measured and analyzed using the chi-square and Mann-Whitney U-tests.

III. RESULTS

This study was done on 32 patients aged from 35-50 years, diagnosed with temporomandibular joint disorder (16 treated with pulsed shortwave diathermy and 16 controls). The intensity of pain before treatment for the first and second group was 8.2, and 8.4 respectively. Regarding the intensity of pain we found statistically significant improvement in the shortwave diathermy group (n = 16) (4.7 ± 1.6) compared to the placebo group (n = 16) (6.8 ±1.5) immediately after treatment. One week later and six weeks later the results were: 3.5 ± 1.3 in the shortwave diathermy group and 6.1 ± 1.5 in the placebo group, and 2.7 ± 1.2 in the shortwave diathermy group and 5.6 ± 1.6 in the placebo group, respectively. The Mann-Whitney U-test showed the reductions were statistically significant ($p < 0.05$). The patients remained symptom free during the follow-up period. The results showed that the reduction of clicking in the placebo group was 94.8% and in the diathermy group 52.4%. One week later in the placebo group, it was 91.2% and in the shortwave diathermy group it was 37.5%. Six weeks later in the placebo group, it was 83.4% and in the shortwave diathermy group 33.2%. The chi-square test showed the differences were significant ($p < 0.05$).

TABLE 1: DEMOGRAPHIC PARAMETERS

Demographic Parameters				
Groups	Gender		Age	Intensity of pain before treatment
	Male	Female		
Shortwave diathermy (n = 16)	8	8	40 ± 6.4	8.2
Control (n = 16)	8	8	42 ± 5.2	8.4

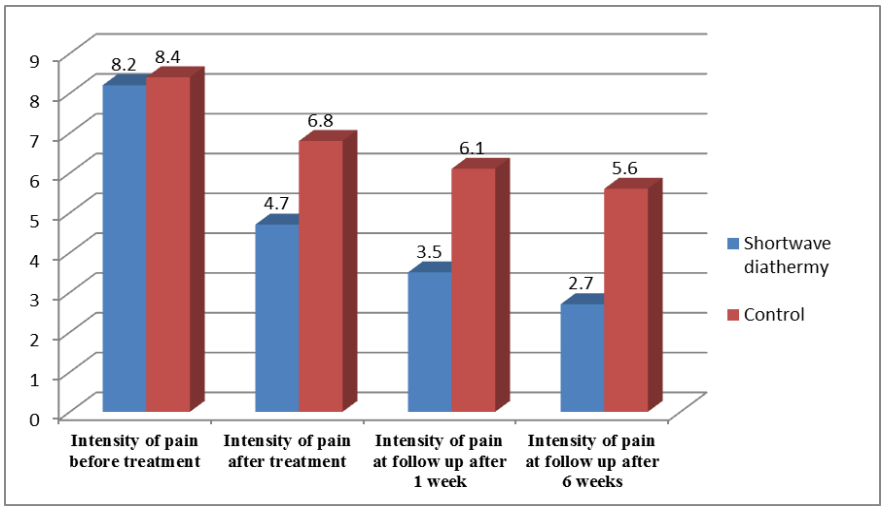

Figure 1: Pain intensity assessment in both groups.

IV. DISCUSSION

As a group, Temporomandibular Disorders are a pathological entity related to functional changes in the temporomandibular joint, mastication muscles and other orofacial structures [11]. They are clinically characterized by pain in the temporomandibular joint, the muscles of mastication and/or the pre-auricular area. They are also accompanied by limited or asymmetric mandibular movements and/or joint sounds (clicking) [12, 13].

Shortwave diathermy is used for deep vigorous heating. It heats tissue at depths of 3 to 5 cm by transferring energy into deep tissue through high frequency current. Tissue temperature is controlled by the length of application, with maximum increases of 4º C to 6º C. [14] Diathermy heats large areas and may be more suitable in treatment of tempromandibular joint disorders. [15]

Considerable work has focused on determining the effects of shortwave diathermy on pain and clicking management.

The results obtained from the study clearly demonstrated that shortwave diathermy is effective in reducing pain intensity and clicking in patients with tempromandibular disorders. All the patients showed increase in pain intensity and clicking in the assessment before starting the treatment.

Shortwave diathermy rapid impact can be attributed to its deep effects on tissues and joints after intervention.

In this study we found that the improvement in the intensity of pain was statistically significant in the shortwave diathermy group (n = 16) (4.7 ± 1.6) compared to the placebo group (n = 16) (6.8 ±1.5) immediately after treatment. Additionally at follow up one week later and six weeks later the results were: 3.5 ± 1.3 in the shortwave diathermy group and 6.1 ± 1.5 in the placebo group, and 2.7 ± 1.2 in the shortwave diathermy group and 5.6 ± 1.6 in the placebo group, respectively. The reductions were statistically significant ($p < 0.05$). The patients remained symptom free during the follow-up period. The results showed that the reduction of clicking in the placebo group was 94.8% and in the diathermy group 52.4%. One week later in the placebo group, it was 91.2% and in the shortwave diathermy group it was 37.5%. Six weeks later in the placebo group, it was 83.4% and in the shortwave diathermy group 33.2%. This study showed that the differences were significant ($p < 0.05$).

V. CONCLUSION

Shortwave diathermy is an effective treatment for reducing pain and clicking associated with tempromandibular joint disorders. There was a significant difference between shortwave diathermy and placebo group in the outcome measures of tempromandibular joint pain and clicking.

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