

A PROSPECTIVE CLINICAL STUDY TO EVALUATE THE EFFECTIVENESS OF ACUPUNCTURE TREATMENT FOR TEMPOROMANDIBULAR JOINT MUSCULAR DISORDER

Ahila Singaravel Chidambaranathan^{1*}, Thulasingham Culathur²

¹Department of Prosthodontics, SRM Dental College, Ramapuram, Chennai-89, TamilNadu, India. ahilasc@yahoo.co.in

²Department of Prosthodontics, Tamil Nadu Govt Dental College, Chennai-3, India.

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ABSTRACT

The main purpose of the clinical study was to evaluate the effect of acupuncture treatment for pain due to TMJ muscular disorder. A total of 15 patients between 14 and 50 years with pain around TMJ without radiographic changes were included and acupoints *Ting Hui*, *Ting gong*, *Ermen*, *Fengchi*, *Baihui He Gu*, and *He Gu* were selected in which a sterile 32 gauge ½ inch stainless steel needles were manually inserted to a depth of 3 to 7 mm and stimulated by giving clockwise and counter clockwise motion for 30 seconds for every 10 minutes for 3 sessions, then the needles were removed from the respective acupoints. The treatment was pursued once a week continuously for 6 months and the pain scores were calculated using the Visual Analog Scale. The obtained pain scores were statistically analyzed using repeated ANOVA and Post hoc tests (Bonferroni). The results of this study showed that the pain score was reduced by 2 and 4.13 units after 3 and 6 months of acupuncture treatment for TMJ muscular disorders. TMJ disorder muscular pain had come to a minimum level and also mouth opening has come to near normal after 6 months of acupuncture treatment.

Key words: Acupuncture, Acupoints, Orofacial pain, Masticatory muscles, Temporomandibular joint disorder, Splint therapy.

Introduction

The routine complaint raised by the patient to the general dental practitioner is temporomandibular joint disorders (TMD). The origin of pain may be due to non-odontogenic in the orofacial region which can refer to masticatory muscles, periauricular region, teeth, and head and ear area with some otologic manifestations such as tinnitus, vertigo, and ear fullness [1, 2].

The data given by an epidemiological study that 30-year-old women are most likely to be affected and approximately 10% of the population by TMD [1, 2]. Psychological tension, occlusal discrepancy, trauma, orthodontic treatment, joint laxity, health problems, malnutrition, and exogenous estrogen are the most contributing factors for TMD disorders [3-5].

Temporomandibular disorder is categorized into intraarticular and extraarticular. Musculoskeletal conditions are the most common cause of TMD, accounting for at least 50% of cases [6-8]. The treatment option to manage the pain of masticatory muscles are therapeutic exercises, drug therapy, splint therapy, injection therapy, surgical procedures, and acupuncture [9].

Acupuncture is used as an adjunct therapy to local anesthesia and the suggested mode of treatment for TMJ clicking and locking, orofacial pain, trigeminal neuralgia, dental anxiety,

xerostomia, gag reflex, and Vitamin B12 deficiency [10]. The idea behind acupuncture treatment is stimulation of specific acupoints using a specially designed needle is in practice apart from the heat, laser, electric stimulation, and suction cups [11].

Acupoints can be located everywhere on the human body's skin surface when human beings found that diseases could be cured after certain points were accidentally burnt or punched. In internal organs diseases, the bad *qi* travels through the meridians of the respective organs and reflects on the corresponding acupoints as soreness. The evacuating point of *qi* on the skin surface is used to pinpoint the disease's origin. It is also the entrance for elements from the external into our body [12]. Hence this study was commenced to evaluate the effect of acupuncture treatment on muscular TMD after 3 and 6 months of acupuncture treatment. A hypothesis was formulated that TMD muscular pain will be reduced after treatment with acupuncture treatment.

Materials and Methods

This prospective study was carried in the patients reported to the outpatient dispersal of Department of Prosthodontics, Tamil Nadu Government Dental College, Chennai, with the complaints of pain on both sides of TMJ for 3 months.

Inclusion criteria

The patients between 14 and 50 years with pain in TMJ for 3 months, deviation of mouth opening, restricted mouth opening, and clicking sound with stable vital signs and without neurological symptoms were included for this study.

Exclusion criteria

Patients with mental sickness, neurological disorder, insulin therapy, severely attrited teeth, oral ulcers due to Bechet’s disease. Also, patients had an abnormality in TMJ [13] previous TMJ and orthognathic surgery, radiological changes due to TMJ osteoarthritis, malignancy, condylar resorption, condylar fractures, pregnancy or lactation, current use of corticosteroids, nonsteroidal anti-inflammatory therapy, narcotics, muscle relaxants, or herbal medicines.

Treatment plan

After completing the history and clinical examination, the treatment was started after obtaining informed consent from the subject. Patients were provided enough time to deliberate their participation with the written information and the study was started after obtaining institutional ethical committee approval. This research was carried out after obtaining informed consent and ethical approval. (TNDrMGRMU/TNGDCH/2002/PG/001) A total of 15 patients (Male:8 and Female:7) with pain in and around the TMJ region without any radiological changes in TMJ were selected for this study. Acupuncture was performed by a dentist qualified for acupuncture.

Acupoints *Ting Hui* points GB2 (anterior to the inter-tragic notch at the posterior border of the condylar process of the mandible), *Ting gong* SI 19 (anterior to the tragus and posterior to the condylar process of the mandible, a depression created while opening the mouth), *Er Men* TW 21 were identified in front of the ear (**Figure 1**), *Fengchi* GB 20 (located on the lower aspect of the occipital bone of the sunken of the mastoid process where the sternocleidomastoid and trapezius muscles attached *Baihui* DU 20 (vertex of the midline and 5 cm posterior to the anterior hairline of head) (**Figure 2**), *He Gu* LI4 (situated on the dorsum of the hand, radial to the midpoint of the second metacarpal bone between index finger and thumb) (**Figure 3**).



Figure 1. Acupoints GB2,SI 19,TW21



Figure 2. Acupoint DU 20 Baihui



Figure 3. Acupoint LI4

A sterile ½ inch 32-gauge stainless steel needle was inserted to a depth of 3 to 7mm. The needles were stimulated by giving clockwise and anticlockwise motion for 30 seconds, then the needles were removed after 30 minutes from the acupoints. The treatment was pursued once a week continuously for 6 months and the pain scores were calculated before and after 3 and 6 months of treatment and the pain scores were calculated using Visual Analog Scale;0 - no pain, 1 to 3 - mild pain, 4 to 6 - moderate pain, 7 to 9 - severe pain and 10- worst pain.

Statistical analysis

The obtained pain scores were statistically analyzed using repeated ANOVA using SPSS statistics version 23 (IBM; Armonk, New York, United State). The pain scores calculated from the patients within 3 and 6 months of acupuncture treatment were done using the Chi-Square test and multiple group comparison was done using Post hoc test (Bonferroni).

Results and Discussion

A total of 15 patients were included for this study with male 8 (53.3%) and female 7 (46.7%) . The pain scores before and after 3 and 6 months of acupuncture treatment were calculated and the validity was checked. The comparison between the pain score value before and after acupuncture treatment was calculated. The Mauchly’s test of sphericity was found to be statistically significant (**Table 1**). Hence,

sphericity cannot be assumed while considering the epsilon value which is more than 0.75, Huynh- Feldt correction was applied (**Table 2**). The pain scores before and after 3 and 6 months of acupuncture treatment were found to be statistically significant $P < 0.05$. When the Post hoc test (Bonferroni) was applied, the pain score was found to be

decreasing in magnitude at each level of acupuncture treatment. The pain score was decreased by 2 units after 3 months of treatment and by 4.13 units around 6 months of treatment, hence it was considered statistically significant (**Table 3**).

Table 1. Mauchly's Test of Sphericity^a

Within Subjects	Mauchly's W	Approx. Chi- Square	df	Sig	Epsilon ^b	Huynh-Feldt
Pain	.622	6.173	2	.046		.788

Table 2. Huynh- Feldt correction using repeated measures ANOVA

Source	Type III Sum of Squares	df	Mean Square	F	Sig
Pain Huynh-Feldt	128.178	1.576	81.356	399.762	.000

Table 3. Post Hoc Tests (Bonferroni) for multiple pair wise comparisons between groups

(I) factor1	(J) factor1	Mean Difference(I-J)	Std. Error	Sig. ^b	95% Confidence Interval for Difference ^b	
					Lower Bound	Upper Bound
Before T	After 3m T	2.000 [*]	.169	.000	1.541	2.459
	After 6m T	4.133 [*]	.091	.000	3.886	4.380
After 3m T	After 6m T	2.133 [*]	.165	.000	1.684	2.582

The features of temporomandibular disorders (TMD) are pain in the preauricular region, masseter muscle, or temporal region during chewing, opening, and closing of the mouth. The diagnosis of TMD is based on history, clinical and radiographic findings. The sounds like clicking and crepitus are heard not only with TMD but also in 50% of asymptomatic patients [14].

On reviewing the literature the most common clinical findings were (96%) facial pain, (82%) ear discomfort, (79%) headache, and (75%) jaw discomfort [15], and other problems like eye, neck, arm, or back pain and dizziness. The case of chronic temporomandibular disorders (TMD) has the same characteristic features for more than 3 months [16].

Patients included for acupuncture were diagnosed with muscular temporomandibular disorders (TMD), which is one of the indications for acupuncture [17]. Acupuncture treatment is carried out in China to treat various diseases, in which fine needles are inserted into various acupoints. Small myelinated nerve fibers of muscles are stimulated to send impulses to the spinal cord which further activate the midbrain and the pituitary-hypothalamus. It has been found that endogenous substances like beta-endorphin, noradrenaline, enkephalin, and serotonin are released during the process [18].

The compression of the trigger points in the compressed skeletal muscle band or muscle fascia produces referred pain, tenderness, autonomic symptoms, and motor dysfunction. The trigger point formed at the injured muscle neuromuscular junction will release more acetylcholine from the presynaptic nerve terminals and destroy the receptors in the postsynaptic sarcolemma. The powerful neural stimulation leads to a release of calcium from the sarcoplasmic reticulum. Hence the concentration of calcium increased gradually on a sustained contraction of muscle fibers [19].

Visual Analog Scale (VAS) is the commonly used pain assessment scale proposed by Bond and Pilowsky [20]. The previous literature showed that individuals receiving acupuncture treatment exhibited a significant reduction in facial and neck pain [21]. Smith *et al.* [22] described that stimulation of acupoints ST7 showed improvement in pain severity, functional movements of the jaw, and reduction of tenderness in a lateral pterygoid muscle.

The intensity of pain score was reduced five times and the mouth opening increased from 36.95 to 42.35 mm after acupuncture therapy [23]. The effect of acupuncture treatment compared to occlusal splint with temporomandibular disorders (TMD), showed better results in mouth opening of females since the acupoint stimulation relaxes the masticatory muscles [24, 25]. It was also derived

that acupuncture and splint treatment reduced the severity of pain, but only the acupuncture gave a better subjective result than the splint therapy [26].

The result of this prospective study showed that the frequency of pain score 8 occurred 9 times before treatment, and pain score of 6 was obtained 15 times after 3 months of acupuncture treatment and pain score of 4 occurs 9 times after 6 months of treatment which showed that there is a gradual decrease in pain score after acupuncture treatment. Comparison within the groups was done with Bonferroni corrections which showed a significance value $P < 0.05$. Hence it is considered as statistically significant which validated the results of the previous study. Hence this study accepted the hypothesis formulated for this study.

It was found that acupuncture may be a realistic alternative to conventional treatment. But it may not be useful for eliminating the cause of TMD resulting from structural anomalies, such as degenerative changes and disc displacement. It mainly helped to get rid of the pain and discomfort associated with muscular TMJ disorders. It has been found that acupuncture helps in muscular relaxation and relieves muscle spasms [27].

Limitations of the study are the sample size was small and no control group to evaluate the effects of the treatment in long term. Since patients have exhibited different kinds of responses to acupuncture, it is difficult to specify how many sessions are required for complete recovery. For future studies, we suggest randomized studies including the control group to check specific acupuncture effects with larger size sample sizes to experiment with the long-term efficacy of acupuncture treatment.

Clinical application

As the acupuncture treatment is cost-effective and non-invasive, hence it can be recommended for public service for patients with muscular TMJ pain without any radiological changes in TMJ for less than 3 months.

Conclusion

Acupuncture treatment reduces the pain due to muscular TMJ disorders which is statistically significant. But clinically acupuncture treatment gradually reduced the symptom of muscular TMJ disorders and is also an effective treatment method to reduce pain intensity and safe procedure. Hence it is recommended as an alternative treatment option to the conventional method of management of muscular TMD and facial pain.

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