

## Effect of manual therapy on range of motion, pain and quality of life in temporomandibular joint dysfunction

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**Abstract.** Temporomandibular joint dysfunction (TMJD) is an important health problem that occurs approximately in 22 to 35 percent of adults. This study aims to investigate effect of manual therapy (MT) on range of motion (ROM), pain and quality of life in patients with TMJD. *Materials and Methods:* This study enrolled 15 adults who were aged 21 to 54 years, including 11 women (73.3%) and 4 men (26.7%) (mean age; 37.50 ± 16.50 years). The patients were treated with MT (a-50 min. session; 8 sessions in two weeks). Proprioceptive Neuromuscular Facilitation (PNF) (Hold-Relax technique) exercises were also applied. An instructed home exercises were recommended to all the patients. ROM (depression, protrusion and lateral deviation of temporomandibular joint (TMJ)) was measured before and after the manual therapy program. Pain intensity was evaluated with VAS. Short Form-36 (SF-36) was used to describe the quality of life of the patients. *Results:* Significant improvements in ROM were recorded ( $p < 0.05$ ). Morning pain, meal-associated pain, and post-prandial pain decreased ( $p < 0.05$ ), while no significant differences were found in terms of pre- and post-therapy night pain and SF-36 scores ( $p > 0.05$ ). *Conclusion:* MT is effective to manage TMJD decreasing pain intensity and improving ROM of TMJ.

**Key words:** temporomandibular joint dysfunction, pain, manual therapy, quality of life.

### Introduction

Temporomandibular joint dysfunction (TMJD) is an important health problem that occurs approximately in 22 to 35 percent of adults, involves the temporomandibular joint (TMJ) and its surrounding soft tissues and joints. TMJD also reduces social and functional capacity of patients substantially. Since certain functions, such as eating and speaking are affected, the condition leads to substantial problems in daily living activities. Twenty percent of subjects suffering from TMJD need treatment. Surgery is ultimately requires in approximately 10% of all patients who try non-surgical treatment options. Ninety percent of surgical cases are women. The range of motion (ROM) is limited in 50% of patients with TMJD (1-4).

Since TMJD is usually a self-limiting condition and the clinical status, analgesic and anti-inflammatory medications are preferred in the treatment along with conservative treatment options, such as splint, exercise, and physical therapy. Physiotherapy methods are reported as treatment options most commonly used in management of TMJD by American Academy of Craniomandibular Disorders and Minnesota Dental Association (5).

Recently, complementary medicine modalities, such as acupuncture and phytotherapy are commonly preferred for improving chronic pain caused by TMJD. Their side effect profile is favorable. They increase quality of life improving pain. Acupuncture has various practices depending on the actual condition. These methods are classified into invasive (needle acupuncture, needle electro puncture) and non-invasive (needleless electro puncture, laser puncture, acupressure) (6-10).

Since many symptoms of TMJD may regress without any therapy, it is always recommended to initiate the treatment with non-invasive methods including physiotherapy, relaxation techniques, behavioral therapy, psychotherapy, hypnosis and acupressure (11).

In the related literature, there are few studies about the effectiveness of manual therapy. That's why, this study was conducted to investigate efficiency of manual therapy in TMJD.

### Material and Method

*Participants.* The study included 15 adults suffering from TMJD. Eleven women (73.3%) and 4 men (26.7%) (age ranges = 21 to 54 years) were studied. Patients had a history of fractured jaw or orthognathic surgery, on

psychiatric treatment, and had systemic generalized joint diseases, such as rheumatoid arthritis, and neurological disorders, congenital diseases or facial paralysis were excluded from the study.

*Statement of ethical principles for medical research involving human subject.* This study was planned and conducted following ethical principles for medical research involving human subjects according to the Declaration of Helsinki.

This study was also conducted in a manner that minimizes possible harm to human rights. All participants gave their informed consent to participate.

*Inspection and clinical features.* The patients were evaluated in terms of certain pathologies, such as edema and ecchymosis, and prostheses, denture and decays (12).

*ROM:* Fingers of both hands were placed on in front of external auditory canal of both ears and patients were asked to open and close mouth following by mandibular protrusion. A caliper was used to measure mandibular depression, protrusion and lateral deviation (Figure 1). Any “click” voices during joint movements and any deviation were also recorded (13).

The range of mandibular depression is approximately 34-44 mm. Active protrusion of the mandible up to 10 mm is regarded normal. Mandibular lateral deviations should be equally distance to the mid-line. When patients are asked to move the jaw to both sides without total loss of contact between teeth of upper and lower jaws, the normal range should be 10 mm (12).



**Figure 1.** Measurement of range of motion of temporomandibular joint- depression

*Pain intensity and quality of life.* Morning pain, meal-associated pain, postprandial pain and night pain were measured using Visual Analogue Scale (VAS) (a 0- to 10-item scale) and the activities that provoked pain were recorded (14).

Before and after manual therapy sessions, the patients were asked to fill in a Quality of Life Index [Short Form-36 (SF-36)] to evaluate their quality of life (15).

*Manual therapy.* Patients received 8 manual therapy sessions (two sessions per week) (approximately 50 minutes per session) (Figure 2).

Each manual therapy was consisted of myofascial relaxation techniques for temporal, masseter, scalene, digastric, mentalis, sternocleidomastoid (SCM) and perihyoid muscles; myofascial relaxation techniques for medial pterygoid muscles with intraoral approach, fascial release techniques for anterior, posterior, and lateral fascia, stretching techniques for the posterior capsule of TMJ, muscle-energy techniques to increase function of TMJ, and PNF/Hold-Relax techniques combined with breathing to inhibit over activation of scalene and SCM muscles.

The patients advised to make exercises twice a day (10 times for each exercise).



**Figure 2.** Manual therapy session

*Data Analysis.* Study data was analyzed using SPSS for Windows version 21.0. Analytical methods were used to determine if variables had normal distribution. Inter- and intra-group comparisons were analyzed with Mann-Whitney U test and Wilcoxon signed rank test, respectively. Spearman's rho coefficient was also used to show the relation between two non-parametric measurable variables. Statistical significance, *p*, was set to <0.05.

## Results

Results belonging to 15 patients [11 women (73.3%) and 4 men (26.7%)] with mean age of  $37.50 \pm 16.50$  years were given in this section. Clinical features of the sample are shown in Table 1.

**Table 1.** Clinical features of the patients

Clinical features	Operation		Trauma		Caries		Prosthesis	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Yes	6	40	2	13.3	4	26.7	1	6.7
No	9	60	13	86.7	11	73.3	14	93.3

While significant improvements were found in morning, meal-associated, and postprandial pain scores ( $p < 0.05$ ), there was no difference in night pain scores ( $p > 0.05$ ) (Table 2).

**Table 2.** Pain intensity of patients according to VAS before and after manual therapy

Pain	Before Therapy		After Therapy		<i>P</i> *
	Mean±SD	Min-Max	Mean±SD	Min-Max	
at morning	2.3±2.7	0.0-8.0	0.9±1.6	0.0-4.0	0.018
at night	1.3±2.8	0.0-7.0	0.4±1.1	0.0-4.0	0.109
during the meal	4.0±2.6	0.0-8.0	2.4±2.3	0.0-6.0	0.003
before dinner	1.9±2.0	0.0-6.0	0.8±1.3	0.0-4.0	0.027

\* Wilcoxon signed-rank test, SD: Standard Deviation. VAS: Visual Analog Scale.

Significant improvements in scores of mandibular depression and protrusion as well as right and left mandibular deviation after therapy were recorded (Table 3) ( $p < 0.05$ ).

**Table 3.** Range of motions (ROM) of temporomandibular joint before and after therapy

ROM	Before Therapy		After Therapy		P*
	Mean±SD	Min-Max	Mean±SD	Min-Max	
Mandibular Depression (mm)	3.6 ± .9	1.5-5.3	4.0 ± .8	2.0-5.5	0.001
Mandibular Protrusion (mm)	0.3 ± .2	0.1-0.7	0.4 ± .2	0.2-0.7	0.008
Right Deviation (mm)	0.8 ± .4	0.3-1.8	1.0 ± .3	0.5-1.8	0.002
Left Deviation (mm)	0.8 ± .3	0.4-1.1	1.0 ± .3	0.6-1.6	0.003

\* Wilcoxon signed-rank test, SD: Standard Deviation, ROM: Range of Motion

No significant differences in terms of SF-36 scores were found (Table 4) ( $p > 0.05$ ).

**Table 4.** Quality of Life Index (SF-36) scores before and after therapy

Item	Mean ± SD	Min	Max	P*
BT SF-36 Physical Functioning	81.3 ±23.0	20.0	100.0	0.102
AT SF-36 Physical Functioning	85.7 ±21.3	20.0	100.0	
BT SF-36 Physical Role	66.7 ±45.0	0.0	100.0	0.180
AT SF-36 Physical Role	76.7 ±41.7	0.0	100.0	
BT SF-36 Pain	58.8 ±27.7	12.0	100.0	0.075
AT SF-36 Pain	67.4 ±20.5	31.0	100.0	
BT SF-36 General Health	61.2 ±15.2	35.0	87.0	0.715
AT SF-36 General Health	62.1 ±12.1	35.0	82.0	
BT SF-36 Energy	51.0 ±19.0	20.0	80.0	0.458
AT SF-36 Energy	52.7 ± 18.3	20.0	80.0	
BT SF-36 Social Functioning	54.2 ± 30.1	0.0	100.0	0.216
AT SF-36 Social Functioning	61.7 ± 29.7	12.5	100.0	
BT SF-36 Emotional Well-being	62.2 ± 46.9	0.0	100.0	0.785
AT SF-36 Emotional Well-being	64.4 ± 47.9	0.0	100.0	
BT SF-36 Mental Health	70.7 ± 14.4	48.0	96.0	0.739
AT SF-36 Mental Health	72.0 ± 13.9	52.0	96.0	

SF-36: Short Form-36, \* Wilcoxon signed-rank test, SD: Standard Deviation, BT: Before Therapy, AT: After Therapy

## Discussion and Conclusion

The results obtained from this study showed that the manual therapy is an effective method to reduce pain intensity and to increase ROM of TMJ. In a study conducted by De Toledo et al. to investigate interdisciplinary cooperation of a dentist and a physiotherapist in treatment of TMJD, the authors reported a significant recovery of pain in the physiotherapy group (16). Our results are similar to the study by De Toledo.

Celic et al. conducted a study on 180 cases to investigate the relation between limitation of the mandibular ROM and the mandibular dysfunction and they compared the ROM of the patients with TMD and the control group characterized by isolated limitation of the mandibular ROM. The authors revealed out that the ROM was lower in the TMJD group than the asymptomatic control group with limitation of the mandibular ROM (17). In our study, ROM increased after manual therapy sessions. However, the SF-36 scores did not increase after the treatment ( $p>0.05$ ). Freire et al. conducted a study to assess importance of physiotherapy practices in diagnosis of TMJD and 24 cases received a physiotherapy program including electrotherapy, thermotherapy, manual therapy, and exercises. Patients were evaluated three times: before treatment, immediately after treatment, and 2 months after treatment. The cases were complaint-free by 41.7% after the therapy and the effect was also verified when patients were evaluated 2 months later. In conclusion, they observed that physiotherapy modalities were effective for TMJD in early to early-moderate term and they also reduced pain and clinical findings along with other positive effects (18). Lemos et al. conducted a study with 135 cases to investigate effects of pain secondary to TMJD and oral and dental health on the quality of life and they concluded that worsening of TMJD-associated symptoms decreases the quality of life scores (19). Rovida et al. investigated effects of temporomandibular joints on the quality of life in 39 caregivers who are older than 60 living in Brazil and the authors reported that TMJD has no statistically significant link to the quality of life ( $p<0.05$ ) and that it has no effect on TMJD-related quality of life measurement on the SF-36 Quality of Life Index (20). Tuncer et al. compared home exercise program and manual therapy in treatment of TMJD and 40 participants with disc problem associated with TMJ reduction and/or myofascial pain were randomly assigned to exercise therapy group and manual therapy group. Education and posture exercises were prescribed for the exercise group, while education, postural exercises and TMJ and soft tissue mobilization were applied. The authors noted a decrease in VAS scores and improvement in the head posture after therapy. Inter-group comparison pointed to a significant recovery that favored the manual therapy group and the authors recommended combining the manual therapy with the exercise therapy to treat patients with TMJD (21). In our study, patients were educated on PNF techniques that were applied for treatment and the techniques were also prescribed as home exercises that would be done twice a day in minimum in 10 repeats per exercise. Similar to the study results reported by Tuncer et al., we also believe that combination of manual therapy and PNF home exercise program is more effective to increase the ROM of the TMJ.

We studied with a small sample. This is a limitation of our study. Even so, the results obtained from study indicate that manual therapy can be used to manage TMJD.

It is observed that manual therapy is effective to manage the pain resulting from dysfunction of TMJ and to increase the normal ROM of TMJ. Manual therapy procedures should be included in the physiotherapy program.

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