

*Medical Data Mining***Nonpharmacological therapies for temporomandibular disorders: a review**

Wen-Jing Ran<sup>1</sup>, Qi Zhang<sup>1</sup>, Xue Feng<sup>1</sup>, Li-Rong Nie<sup>1</sup>, Ying-Shu Jin<sup>2\*</sup>

<sup>1</sup>Department of Graduate, Tianjin University of Traditional Chinese Medicine, Tianjin 301617, China; <sup>2</sup>Department of Infection Control, Stomatological Hospital of Tianjin Medical University, Tianjin 300700, China.

\*Corresponding to: Ying-Shu Jin. Department of Infection Control, Stomatological Hospital of Tianjin Medical University, No.12 Qixiangtai Road, Heping District, Tianjin 301617, China. Email: jys5009@sina.com.

**Highlights**

This present article was the first to elaborate the progress of research on non-drug treatment of temporomandibular joint disorders. Because the different treatment methods will bring some physical and mental pain to patients, it is particularly important to choose effective and less painful treatment methods.



## Abstract

Temporomandibular disorder is one of the common oral diseases. Temporomandibular disorder has negative effects on the patient's physical and mental health, working and quality of life. In clinical practice, the treatments for temporomandibular disorders include a variety of ways, such as Chinese medicine, massage, acupuncture, acupotomology, electroacupuncture, and surgery. Drug treatments often have side effects, and the effect of simple drug treatment is not optimal. In recent years, psychological factors have been proved to be one of the causes of temporomandibular joint disorders. Therefore, psychological therapy is also an important treatment method. There are many different treatments for temporomandibular disorder patients, but some of these treatments can cause both physical and psychological pain, so it is particularly important to choose effective and less painful treatments out of humanity. This paper reviewed non-drug treatments for temporomandibular disorder in recent years to provide evidence for selecting appropriate and effective treatments for patients with temporomandibular disorder.

**Key words:** Temporomandibular disorders, Nonpharmacological, Review, Psychotherapy

---

### *Abbreviations:*

TMD, temporomandibular disorder; CBT, cognitive behavioral therapy; TENS, transcutaneous electrical nerve stimulation; TMJ, the temporomandibular joint.

### *Competing interests:*

The authors declare that they have no conflict of interest.

### *Citation:*

Wen-Jing Ran, Qi Zhang, Xue Feng, et al. Nonpharmacological therapies for temporomandibular disorders: a review. *Medical Data Mining* 2020, 3 (3): 119–124.

**Executive Editor:** Yu-Ping Shi.

**Submitted:** 24 April 2020, **Accepted:** 09 September 2020, **Online:** 24 September 2020

## Background

Temporomandibular disorder (TMD) is one of the common diseases in stomatology. It is characterized by joint pain, sounds during mandibular movement, mandibular movement disorders, et al. Sometimes it is accompanied with dizziness, headaches, tinnitus, and other symptoms [1, 2]. TMD may be caused by multiple factors, such as psychosocial factors, chewing habits, occlusion disorder, and autoimmune system [3–6].

Pharmacological interventions have been used to treat TMD for many years, and the most effective pharmacological agents for the treatment of TMD include analgesics, non-steroidal anti-inflammatory drugs, opioids, muscle relaxants, antidepressants, and anticonvulsants [7]. In view of drug metabolism, pain and dysfunction still recur after drug withdrawal. Therefore, safe and long-term used treatments are urgently needed [8]. In addition, a survey showed that patients with psychological anxiety and depression were more likely to suffer from TMD [9]. Other study also showed that psychological factors were closely associated with TMD [10].

The study aimed to summarize the methods of nonpharmacological therapies of TMD, in order to identify a less painful, safe, cost-effective and effective treatment for patients with TMD.

## Psychotherapy

The medical model has been changed from the bio-medical model to the bio-psycho-social medical model. Social psychology has become an important factor for many diseases. Despite multiple treatments for TMD, psychotherapy has been recognized by more and more scholars worldwide. Psychotherapies include cognitive behavioral therapy (CBT), biofeedback therapy, relaxation therapy, hypnotherapy, et al. Among them, CBT is recognized as one of the effective treatments, and is also suitable for patients with TMD [11].

### Cognitive behavioral therapy

CBT is a structured and cognitive-oriented psychotherapy that includes both cognitive and behavioral aspects. Cognition refers to changing the patient's perception about a thing or object. Behavioral therapy refers to learning subside, suppressing and changing the original bad habits. Therefore, CBT can help patients to find and correct the wrong perception. Ferrando et al. [12] conducted a randomized study to assess the efficacy of CBT for TMD. The results showed that the frequency of pain in the CBT group was significantly reduced compared with control group.

### Biofeedback therapy

Biofeedback therapy is a new psychology method to restore physical and mental health of patients. First, patients' physiological or pathological information is measured by instruments in modern physiological science. Then, patients are trained to consciously control their mental activities. In one study, after 8 weeks of biofeedback and support therapy, the temporomandibular joint (TMJ) dysfunction, muscle tenderness, and pain index were significantly improved in TMD patients [13]. It indicates that this treatment is effective, painless, simple, and convenient. However, few studies were performed and lacked objective quality evaluation of curative effect in China [14].

### Microwave therapy

Microwave therapy is a new type of high-frequency electrotherapy. In one study, 50 patients with TMD were treated with microwave and 30 patients with TMD were treated conservatively. The results showed that microwave therapy was relatively effective compared with traditional conservative treatment [15].

In 2016, Chen et al. [16] assigned 40 patients with TMD into microwave therapy alone group and microwave therapy plus psychotherapy group. The results showed that microwave therapy plus psychotherapy could significantly relieve the pain in patients with TMD compared with microwave therapy alone.

## Traditional Chinese medicine

Acupuncture, massage, acupoints, and orthopedics belong to traditional Chinese medicine, which have been increasingly popular worldwide in recent years. These treatments often are used to treat TMD in clinical practice.

### Acupuncture

According to the theory of traditional Chinese medicine, the needle is inserted into the patient's body at a certain angle. The specific part of the body is stimulated by twisting, lifting and thrusting to play a therapeutic role. Feng et al. [17] treated 38 TMD patients with warm acupuncture and moxibustion combined with external application of traditional Chinese medicine. On the basis of these, the treatment group took off the points, such as Xiaguan (ST7), Jiache (ST6), Tinggong (SI19), and Hegu (LI4) acupoints, using a single-finger cutting method. The physiological function, physical pain, social function and mental health score in the treatment group at 3 months follow-up were statistically higher than those before treatment ( $P < 0.05$ ). Li Nian et al. [18] treated 45 TMD patients with acupuncture. Selected acupoints were as follows: Shangguan (GB3), Xiaguan (ST7), Hegu (LI4), Neiguan (PC6) and Sanyinjiao (SP6). After 14 days, the total effective rate was 95.5%.

### Massage therapy

Massage is a non-pharmaceutical therapy, which treats diseases by pressing the meridian points with the hands and using techniques such as pushing, kneading, et al. Ye Qing et al. [19] randomly divided 60 patients with TMJ disorder into the treatment group and the control group. The treatment group was treated with massage and the control group with acupuncture treated 30 patients with TMD by massage. The results showed that the total effective rate was 96.7% in the treatment group and 90.0% in the control group, which was better than that in the control group. The number of patients relapses was significantly lower than that of the control group and the difference was statistically significant ( $P < 0.05$ ). Gongxu Fang [20] treated 25 cases of TMD with massage combined with thermal moxibustion. After one course of treatment, the temporomandibular joint disorder index in experimental group was significantly lower than that in the control group.

### Acupoint treatment

Acupoint therapy is a common method in traditional Chinese medicine, which is effective for the treatment of a variety of diseases, including periartthritis of shoulder, cervical spondylosis, arthritis, lumbar muscle strain, et al. Zhang Xin [21] used the Xiaguan (ST7) acupoint embedding method combined with warm acupuncture to treat patients with TMD. The patients in experimental group were treated with Xiaguan (ST7) acupoint embedding combined with warm acupuncture and patients in the control group were treated with non-steroidal anti-inflammatory drugs. Warm acupuncture can significantly improve clinical symptoms such as pain, dysfunction maximal mouth opening, increase the degree of social activity, and improve the quality of life. Li Mingzhe [22] used acupoint pressure combined with ultrashort wave therapy to treat TMD patients. The effective rate in the experiment group was 95.74%. The difference between groups was statistically significant ( $P < 0.05$ ).

### Transcutaneous electrical nerve stimulation

Transcutaneous electrical nerve stimulation (TENS) is an electrotherapy method in which a specific low-frequency pulse current is input into the human body through the skin to treat pain. Chen Yinan [23] used transcutaneous electrical nerve stimulation therapy to treat patients with TMD. A randomized, double-blind method was used to divide 20 patients with unilateral TMJ pain into 2 groups, one receiving true TENS and then false TENS, and the other the opposite. After treatment, the patients in the receiving true TENS group had less pain, while the mouth opening limitation would be reduced and thus the mouth opening would be amplified. The difference between the 2 groups was statistically significant ( $P <$

0.001).

### Occlusal splint therapy

Occlusal splint therapy is one of the most important conservative treatments because of its noninvasive and reversible properties. In a study, 18 patients with TMD were treated with stable pad treatment, and 14 patients were treatment with repositioning therapy [24]. The results showed that a significant improvement in joint stiffness and pain was achieved in both groups. Wang Junjie [25] randomly divided 114 patients with TMD into 3 groups. Group A received occlusal plate treatment, group B received ultrashort wave therapy, and group C received combined therapy. The results showed that group C was significantly lower than group A and B. This way can inhibit pain, increase mouth opening and high clinical application value.

### Surgical treatment

In clinical practice, some doctors use surgery to treat TMD, it has also achieved a certain effect, but it brings certain pain and economic pressure to patients. Zhang Lingge et al [26] applied arthroscopy to treat 40 patients with TMD and the maximum degree of mouth opening, pain visual analogue scale before and after treatment at 1, 3, and 6 months. The results showed that the maximal mouth opening and anterior lateral motion after arthroscopic surgery were significantly improved and the pain at the joint was significantly reduced. Differences were statistically significant ( $P < 0.05$ ). Yu Nian [27] explored a treatment for old temporomandibular joint dislocation and performed surgery after drug therapy and manual therapy. The results showed that the patient recovered well and the occlusion relationship was normal. Non-surgical treatment of patients with TMJ disorder can achieve certain effects and relieve some symptoms, but for patients with stubborn lesions and repeated symptoms, surgical treatment is the best treatment.

### Nursing intervention

Nursing intervention can help patients improve mental state and quality of life. Zhao Yajie et al [28] divided 406 patients with TMD into 2 groups (routine nursing in the control group; knowledge presentation and video in the observation group). The results showed that the effective rate in the observation group was 94.09%, and the effective rate in the control group was 81.28%. The difference was statistically significant ( $P < 0.05$ ). In addition, appropriate nursing intervention can improve the quality of life of patients with TMD. Wang Xiumin et al. [29] selected 42 TMDs as the observation group and carried out nursing intervention of psychological, life care and rehabilitation exercise, and 42 patients as the healthy control group. The

Submit a manuscript: <https://www.tmrjournals.com/mdm>

## REVIEW

scores of negative and total stimuli in the observation group were significantly higher than those in the control group ( $P < 0.05$ ). The scores of symptom self-rating scale in the observation group were significantly higher than the control group ( $P < 0.05$ ). The results showed that nursing intervention could improve the mental state and the quality of life in patients with TMD. Therefore, in combination with nursing intervention during the treatment process, the patient can achieve the desired therapeutic effect.

### Discussion

In recent years, there are a variety of ways to treat TMD clinically. The commonly used drugs included analgesics and non-steroidal anti-inflammatory drugs. Diclofenac sodium sustained-release capsule combined with glucosamine hydrochloride capsule have anti-inflammatory and analgesic effects, and can inhibit the damage of soft bone cells.[30] However, the 2 drugs should not be taken for a long time, as long-term use may lead to gastrointestinal bleeding, elevated aminotransferase, et al. Therefore, safe and long-term treatments are urgently needed. Studies have confirmed that the disease is closely related to psychological factors. Attention should be paid to psychotherapy, such as cognitive behavioral therapy and electromyography. Although non-drug therapy has few side effects, some treatments are unsatisfactory. For example, microwave therapy alone may be less effective than microwave plus psychotherapy. Massage and acupuncture have a long history and rich cultural deposits in China. Compared with other treatment methods, they may be safer, and have lower economic cost. However, the effects of acupoint selection and the technical proficiency of doctors are varied. Appropriate nursing intervention and individualized nursing for TMD patients can achieve satisfactory effects.

### Conclusion

According to the review, the efficacy of combined-modality therapy may be better than that of Chinese medicine, western medicine, or psychological intervention alone. In the future, more attention should be paid to the comprehensive combination therapy in clinical practice to help patients reduce pain and economic costs, et al.

### References

1. Luther F. TMD and occlusion part I. Damned if we do? Occlusion: the interface of dentistry and orthodontics. *Br Dent J* 2007, 202: E2–39.
2. Peng YX. Analysis of cases of temporomandibular joint disorders with ear pain as the main clinical manifestation. *Chin J Otol* 2018, 16: 688–692.
3. Yi W, Wang HH, Zhang Q. Research progress on the relationship between Wilson curve and temporomandibular joint disorders. *Stomatology* 2018, 38: 181–184.
4. Li JH, Huang YL. Effects of unilateral chewing on the morphology of temporomandibular joint in adolescents. *Ningxia Med J* 2019, 41: 442–444.
5. Xu LL, Cai B, Fan S, et al. Oral habits of patients with temporomandibular disorders: The 15th National Symposium on Temporomandibular Joint Diseases and Occlusiology, Kunming, Yunnan, China 2018.
6. Yuan YJ, Feng YX, Ren J, et al. Correlation between temporomandibular joint disorders and occlusion factors. *J Oral Sci* 2018, 34: 226–228.
7. Ouanounou A, Goldberg M, Haas DA. Pharmacotherapy in temporomandibular disorders: a review. *J Can Dent Assoc* 2017, 83: h7.
8. Feng YH. Effect of warm acupuncture and moxibustion combined with fumigation of traditional Chinese medicine on friction index. *Liaoning J Tradit Chin Med* 2018, 45: 2189–2193.
9. Wang CY, Zhu Q, Sun JH, et al. Influencing factors of temporomandibular joint disorders in Xuhuai area. *Gen J Stomatol* 2016, 3: 52–54.
10. Li D, Zhang HY, Guo Y. Relationship between temporomandibular joint disorders and psychological factors in school. *J Pract Stomatol* 2016, 32: 718–721.
11. Cui J, Zhang XY, Zhang ZL. Progress in research on psychological status of patients with temporomandibular joint disorders. *Chin J Geriatr Denti* 2018, 16: 362–366.
12. Ferrando M, Galdón MJ, Durá E, et al. Enhancing the efficacy of treatment for temporomandibular patients with muscular diagnosis through cognitive-behavioral intervention, including hypnosis: a randomized study. *Oral Surg Oral Med Oral Pathol Oral Radiol* 2012, 113: 81–89.
13. Wang SQ, Li M, Zhang Q. Glucosamine hydrochloride combined with etonidate gel in the treatment of temporomandibular joint disorders in the elderly. *West Chin Med J* 2012, 27: 1825–1827.
14. Niu WZ, Qu P, Wang PL. Quantitative study of the efficacy of electromyography biofeedback in the treatment of patients with masticatory muscle disorder. *Stomatology* 2015, 35: 770–772.
15. Huang MH. Ultrashort wave treatment of temporomandibular joint disorders. *Chin J Pract Med* 2012, 7: 67–68.
16. Chen QQ, Xiao P, He W, et al. Therapeutic effect of microwave combined with comprehensive psychological intervention on temporomandibular joint disorders. *J Chin Pract Diagn Ther* 2016, 30: 1099–1100.

17. Feng YH, Wang CJ, Liu F, et al. Effects of warm acupuncture combined with traditional Chinese medicine fumigation on Friction index, maximal mouth opening and quality of life in patients with temporomandibular joint disorder. *Liaoning J Tradit Chin Med* 2018, 45: 2189–2193.
18. Li N, Ye SZ, Deng ZL. Clinical observation of acupuncture and moxibustion combined with rehabilitation training in the treatment of temporomandibular joint disorders. *J Pract Tradit Chin Med* 2018, 34: 351–352.
19. Ye Q, Li CB, Shi HN. Therapeutic effect of massage on temporomandibular joint disorder syndrome. *Asia-Pac Trad Med* 2017, 13: 118–119.
20. Gong XF. Clinical observation of massage and thermal moxibustion for treatment of temporomandibular joint disorders. *Acupunct Tuina Med* 2016, 14: 361–365.
21. Zhang X. Therapeutic effect of Xiaguan acupoint combined with warm acupuncture on temporomandibular joint disorder syndrome. *J Pract Tradit Chin Med* 2018, 34: 986–987.
22. Li MZ. Clinical analysis of acupoint point pressure combined with ultrashort wave therapy for temporomandibular joint dysfunction syndrome. *Guangming J Chin* 2017, 32: 1154–1156.
23. Chen YN. Clinical study of percutaneous nerve electrical stimulation in the treatment of patients with temporomandibular joint pain. Nanjing Medical University, 2018.
24. Zhang Q, Huang LL, Li Z, et al. Clinical efficacy of stable pad and repositioning pad for the treatment of temporomandibular joint disorders. *Gen J Stomatol* 2018, 5: 67, 75.
25. Wang JJ. Clinical comparison of occlusal plate, ultrashort wave alone and their combination in the treatment of temporomandibular joint disorder syndrome. *Mod Diag Treat* 2015, 26: 1068–1069.
26. Zhang LG, Wang ZZ, Zhang R, et al. Efficacy evaluation of arthroscopic surgery for temporomandibular joint disorders. *J Med Forum* 2017, 38: 96–97.
27. Yu N, Lu Y. Surgical treatment of old temporomandibular joint dislocation: a case report and literature review. *J Prev Treat Stom Dis* 2019, 27: 46–49.
28. Zhao YJ, He X. Intervention effect of observational nursing education and video education on patients with temporomandibular disorders. *Chin J Mod Drug Appl* 2018, 12: 205–206.
29. Wang XM, Wang D. Effect of nursing intervention on quality of life in patients with temporomandibular joint disorder syndrome. *Gen Pract* 2010, 8: 1411–1412.