Journal of Complementary Therapies in Health
ISSN 2975-9323

Review

Acupuncture in Dental Medicine: Practical Applications.

Amândio Paulo Pinto[1,*], Andreia Zenha[1], Joana Raquel[1], Catarina Abreu[1], Olga Moreira[1], Margarita Domingues[1].

[1] ABS – Health Level Atlântico Business School, Vila Nova de Gaia, Porto, Portugal;
* Correspondence: amandiopaulo@gmail.com

Abstract: Acupuncture, rooted in Traditional Chinese Medicine (TCM), has garnered attention within dental care for its multifaceted therapeutic applications. This review explores the diverse roles of acupuncture in addressing various dental concerns, including postoperative pain management, inflammation reduction, anxiety alleviation, temporomandibular joint (TMJ) disorders, myofascial pain, atypical facial pain, xerostomia, and neural disorders. Acupuncture presents a promising adjunctive therapy, offering effective pain relief, anti-inflammatory effects, and anxiety reduction with minimal adverse effects. Additionally, it shows potential in improving salivary secretion and managing neural conditions like facial palsy and trigeminal neuralgia. While further research is needed to refine acupuncture protocols and establish standardized practices in dental care, its integration holds significant promise in enhancing patient well-being and satisfaction.

Keywords: Traditional Chinese Medicine, Acupuncture, Dental Medicine.

Citation: Pinto AP, Zenha A, Raquel J, Abreu C, Moreira O, Domingues M. Acupuncture in Dental Medicine: Practical Applications. Journal of Complementary Therapies in Health. 2024;2(1) 10.5281/zenodo.11183064.

Academic Editor: Jorge Rodrigues

Received: February 2 2024
Reviewed: April 25 2024
Accepted: May 7 2024
Published: May 13 2024

1. Introduction

For five thousand years, Traditional Chinese Medicine (TCM) has been employed for the prevention, treatment, and diagnosis of diseases, grounded in the theories of TCM itself [1].

Traditional Chinese acupuncture has a history spanning more than 2500 years and is esteemed as one of the most widely recognized complementary and alternative therapies. Acupuncture operates by stimulating specific points on the body. In the course of therapy, thin steel needles are delicately inserted into the areas of focus and subsequently manipulated gently by hand [2,3]. Acupuncture stimulates the nervous system and alters the processing and perception of pain signals, also releasing natural painkillers such as endorphin and serotonin [3].

Effective use in issues related to dental medicine has been studied before4. However, it is important for the dentist to know in which situations its use may be useful. As well, the patient should be aware of the advantages that acupuncture can bring to their specific case [3]. This review aims to explore acupuncture and its practical applications in the dental medicine field.

2. Acupuncture in Postoperative Pain

Surgical removal of impacted wisdom teeth is a routine action in maxillofacial surgery, with pain, swelling, and trismus often associated with an intense inflammatory response [5].

Postoperative pain and swelling resulting from wisdom tooth extraction surgery are usually controlled by administering medication before and after the intervention. Anti-inflammatory medication is commonly used to produce an inhibitory effect of cyclooxygenase. However, these medications are associated with gastric ulcers as well as other adverse effects [6,7].

The goal of acupuncture in these cases is to decrease postoperative pain levels, reducing the need for medication.

Studies suggest that electro-acupuncture decreases postoperative pain, and the analgesic effect is higher when applied pre- and post-intervention compared with post-operative application only [5,8].

3. Anti-inflammatory Action

A review article by Zijlstra, van den Berg-de Lange [9] suggests the anti-inflammatory mechanism of acupuncture. According to the authors, insertion of acupuncture needles stimulates the release of β-endorphins (calcitonin gene-related peptide [CGRP] and substance P). While high levels of CGRP demonstrate proinflammatory action, low concentrations produce a marked anti-inflammatory action. Thus, frequent application of acupuncture may cause continuous release of anti-inflammatory CGRP without stimulation of proinflammatory cells.

4. Anxiety and pharyngeal reflex (gag)

A study of Karst, Winterhalter [10], demonstrated that auricular acupuncture is as effective as intranasal midazolam in reducing dental anxiety and reducing the pharyngeal reflex in patients who would undergo dental extraction.

Rosted, Bundgaard [11] examined the effect of acupuncture administered immediately before dental treatment on anxiety levels. All patients underwent a short intervention of only 5 minutes, resulting in a noticeable decrease in anxiety levels, allowing all planned procedures to be performed.

In a clinical study of Sari and Sari [12], it was analysed the effect of acupuncture on orthodontic patients who demonstrated pharyngeal reflex while obtaining impressions of the upper arch. The results concluded that acupuncture was effective in controlling the pharyngeal reflex in orthodontic patients.

The auricular acupuncture point related to the pharyngeal reflex corresponds to the location of the external acoustic meatus (innervated by the auricular branch of the vagus nerve), and another one adjacent to the auricle (innervated by the auriculotemporal branch of the mandibular division of the trigeminal nerve). Both vagus and trigeminal nerves have branches responsible for sensory and motor function of the larynx, pharynx and palate region. We can postulate that stimulation of these points can inhibit muscle activity, reducing the pharyngeal reflex [13,14].

5. TMJ

The temporomandibular joint is the most complex joint in the human body. It is a joint predisposed to degenerative changes and pathologies as a result of frequent and repetitive stress.

Symptoms commonly associated with temporomandibular dysfunction include pain in the joint itself, generalized orofacial pain, chronic head and ear pain, mandibular dysfunction including hyper- and hypo-mobility, limited movement or clenching of the jaw, painful clicks and pops in the opening and closing of the mouth, and difficulty chewing or speaking.

Temporomandibular joint dysfunctions fall into the following three categories: (1) Masticatory muscle disorders; (2) Internal disruption of the joint; and (3) joint degeneration.

Even though acupuncture is not helpful in eliminating the cause of temporomandibular disorder resulting from structural anomalies, such as degenerative changes and disc displacement, this treatment helps relieve the pain and discomfort associated with these conditions. It is documented that acupuncture can help in muscle relaxation and reducing spasms of muscular origin [15].

TMJ acupuncture is based on several techniques and meridians located on the face, including distal points [16]. The literature demonstrates that this technique has positive results in the treatment of chronic pain due to its anti-inflammatory, anxiolytic and muscle-relaxing properties and activating immune function in the human body [16,17]. This disorder affects a large number of people, with no effectiveness in the signs and symptoms that patients present in some of the therapies normally used [16].

In the study of Junior, Esteves [16], the treatment of individuals with temporomandibular disorders was carried out through the use of an acupuncture protocol, as described in Table 1.

Table 1. Acupuncture points used for the treatment of temporomandibular disorder in the study of Junior, Esteves [16].

Acupuncture points	Action
GB41 (*Zulinqi*) and TB5 (*Waiguan*)	Opening points of two extraordinary vessels, respectively Dai Mai and Yang Wei Mai. These extraordinary vessels act as reservoirs of Qi in relation to the main meridians.
LI4 (*Hegu*)	Yuan point of the Da Chang meridian and is one of the Acupuncture points that act on the harmonization of High and Low energy and acts on the circulation of Yang Ming.
ST6 (*Jiache*)	The point's main energetic functions are to strengthen the teeth and jaw, improve TMJ Qi, remove Qi obstruction in energy channels, disperse wicked wind and cold, clear wicked heat and relax facial muscles.
TB17 (*Yifeng*)	Strengthen the Qi of the Triple Heater, disperse wicked wind and heat, strengthen the Qi of the ear and vision region, and relax the tendons and muscles.

The results of this experimental research showed great efficiency in controlling signs and symptoms, essentially pain, making it a very useful technique.

5.1 TMJ clicks and pops

The common cause of joint sounds is thought to be dislocation of the anterior disc. Attachment of the lateral pterygoid to the anterior articular disc has led to the theory that some anterior disc dislocations may be related to lateral pterygoid muscle dysfunction. This theory suggests that hyperactivity of the upper head of this muscle has the ability to anteriorise the disc relative to its normal position on the mandibular condyle.

Acupuncture helps minimize clicks and pops of the temporomandibular joint by relaxing the lateral pterygoid muscle and thus reducing anterior pressure on the meniscus [15,18].

6. Myofascial pain

Myofascial pain is characterized by localized muscle points that are hypersensitive to touch (trigger points) [19,20]. These trigger points can result from muscle overload caused by trauma or repetitive activity, causing abnormal stress on specific muscle groups [21,22].

Clinically, the patient has complaints of tenderness and tension, headaches, limited movement, and weakness [22].

Some studies have already been performed with acupuncture in patients diagnosed with myofascial jaw muscle pain. In these studies, a significant improvement in mandibular and neck pain, as well as mandibular/facial pressure, was noted. Finally, a significant increase in pain tolerance by the masseter muscle was also observed [23].

7. Atypical Facial Pain

Originally, the term was used to describe patients whose response to neurosurgical procedures was not "typical" [24,25]. This term was applied to various types of facial pain, and was considered to represent a psychological disorder. However, no diagnostic criteria have ever been created.

It is postulated that acupuncture stimulates the nervous system and causes the release of some neurochemical messenger molecules. These biochemical changes influence the body's homeostatic mechanisms, promoting the patient's physical and emotional well-being. Stimulation of certain acupuncture points show action in areas of the brain known to reduce pain and stress sensitivity [26,27].

8. Xerostomia (dry mouth)

Saliva is fundamental to our oral health and well-being. It has several important physiological functions such as lubrication, digestion, antibacterial/antifungal activity, buffering, remineralisation and the production of growth factors and other regulatory peptides [28]. In addition, speech, swallowing and taste require the presence of saliva. When the protective function of saliva is compromised, it has a very negative effect on oral health. Decreased saliva production (hyposalivation) usually results in a feeling of dry mouth (xerostomia) [28]. Other negative effects are an increase in caries, an increase in the rate of acute gingivitis, dysarthria, dysgeusia, an increase in the rate of candidiasis and a burning tongue sensation. Besides, other negative effects are changes in taste, halitosis and decreased dental retention. All these symptoms have a profound negative impact on patients' quality of life [29].

According to several authors [30-32], there are several local or systemic factors that can promote changes in salivary secretion, such as:

- Adverse effects of drugs with anticholinergic action (very common with tricyclic antidepressants and antipsychotics),
- It has been reported that the risk of developing xerostomia increases with the use of polymedication,
- The use of radiotherapy or chemotherapy or a combination of both in cases of head and neck cancer.
- Autoimmune diseases (such as Sjögren's Syndrome) and less frequently in other diseases such as sarcoidosis, HIV infection and HCV.

Various therapeutic strategies are available for xerostomia. However, common therapeutic options can have adverse side effects such as nausea, vomiting, increased urination and headaches [33].

Due to these and other limitations in the care of patients with xerostomia, complementary therapies have increased their use among these patients [34], one of the most widely used being acupuncture.

The mechanism of action by which acupuncture can help increase salivary flow is not yet fully understood, but several hypotheses have been suggested [3,35-37], including:

- Neuronal activation of the sympathetic and parasympathetic nervous systems resulting in increased salivary secretion;
- Release of neuropeptides such as the vasodilator calcitonin gene-related peptide. These neuropeptides have anti-inflammatory properties and trophic effects on the salivary gland and increase blood flow in the acini;
- Another explanation is that acupuncture can directly affect local blood flow in the vicinity of the salivary gland and thus increase salivary secretion;
- Acupuncture can also stimulate the neuronal circuit, activating the salivary nuclei in the pons and subsequently activating the salivary glands via the cranial nerves.

Several studies have explored the effect of acupuncture on oral dryness. Although some studies [38,39] suggest a positive effect, more studies of the effects of acupuncture on salivary secretion and xerostomia symptoms are warranted.

9. Neural disorders

Acupuncture is a technique that can be applied to manage various nerve-related disorders, such as facial palsy [40,41] and different types of neuralgias [42,43].

In the context of Bell's facial palsy, acupuncture seems to enhance nerve excitability and foster the regeneration of nerve fibres [40,44,45]. This is achieved by regulating the flow of Qi (energy) in the meridians (energy pathways), harmonizing the balance of Qi and Blood, and fortifying the body's resistance to external Wind pathogens.

In the case of trigeminal neuralgia, acupuncture appears to soothe nerve conduction and manage the distinctive sharp pain associated with this condition [46-48].

Acupuncture operates on the principle of balancing and restoring equilibrium between Yin and Yang. This concept can be paralleled with a more contemporary and Western definition that acupuncture modulates the imbalance between sympathetic and parasympathetic activity.

Specific points used in the treatment of these conditions include a point near the mandible angle, in the prominence of the masseter muscle, and one located in the depression between the zygomatic arch and the sigmoid notch. These two points are anatomically situated near branches of the facial nerve.

As well, recent research [49] indicates that laser acupuncture can be employed to address sensory changes and motor issues resulting from dental procedures. The suggested wavelengths for this treatment range from 790 nm to 810 nm, with a recommended frequency of at least two sessions per week. All the studies evaluated reported some degree of improvement in the sensory or motor recovery of facial nerves. Therefore, laser acupuncture has emerged as a feasible option in dentistry for treating numbness (paresthesia) and facial paralysis, given its therapeutic potential in neuropathic treatment.

10. Final remarks

Needle activation of afferent nerve fibres A delta and C in the muscle send signals to the spinal cord, where dinorphine and encephalin are released, continuing to the mesencephalon, activating excitatory mediators and inhibitors in the spinal cord.

Consequently, the release of serotonin and norepinephrine into the spinal cord leads to inhibition of both pre- and postsynaptic pain conduction in the spinothalamic tract.

In addition, these signals reach the hypothalamus and pituitary glands, triggering the release of adrenocorticotropic hormones and β-endorphin [50].

The therapeutic effects referred in this article seem to occur due to the modulation of the limbic-paralimbic-neocortical network. As other researchers suggest [51,24], acupuncture seems to produce its analgesic, anxiolytic, and other effects via the mediation of this intrinsic neural circuit, being a central role in the affective and cognitive dimensions of pain. Since the use of acupuncture has non-existent or minimal side effects, does not cause dependency (usually associated with some medications) and is simply and conveniently used in the clinical setting, it makes sense to be applied in specific cases where this complementary treatment can promote a higher level of patient satisfaction and well-being.

CRediT author statement: Conceptualization: A.P.; Formal Analysis: A.P., A.Z., J.R., C.A., O.M. and M.D.; Investigation: A.P., A.Z., J.R., C.A., O.M. and M.D.; Methodology: A.P. and M.D.; Project Administration: A.P. and M.D.; Supervision: A.P. and M.D.; Writing – Original Draft Preparation: A.P., A.Z., J.R., C.A., O.M. and M.D.; Writing – Review & Editing: A.P., A.Z., J.R., C.A., O.M. and M.D.

Conflicts of Interest: The author declare no conflict of interest.

References

1. Wang Q, Wei N, Xu L, Hua H, Li J, Jiang Y, et al. TCM Fingerprint database: A digital approach to scientifically reflect the internal quality of traditional Chinese medicine. Pharmacological Research - Modern Chinese Medicine. 2023;7:100261. doi:https://doi.org/10.1016/j.prmcm.2023.100261

2. Rodrigues JM, Santos C, Ribeiro V, Silva A, Lopes L, Machado JP. Mental health benefits of traditional Chinese medicine – An umbrella review of meta-analyses. Brain Behavior and Immunity Integrative. 2023;2:100013. doi:10.1016/j.bbii.2023.100013

3. Naik PN, Kiran RA, Yalamanchal S, Kumar VA, Goli S, Vashist N. Acupuncture: An Alternative Therapy in Dentistry and Its Possible Applications. Medical Acupuncture. 2014;26(6):308-14. doi:10.1089/acu.2014.1028

4. Müller M, Schmucker C, Naumann J, Schlueter N, Huber R, Lederer A-K. Acupuncture in management of acute dental pain – A systematic review and meta-analysis. Jpn Dent Sci Rev. 2023;59:114-28. doi:https://doi.org/10.1016/j.jdsr.2023.02.005

5. Tavares MG, Machado AP, Motta BG, Borsatto MC, Rosa AL, Xavier SP. Electro-acupuncture efficacy on pain control after mandibular third molar surgery. Braz Dent J. 2007;18(2):158-62. doi:10.1590/s0103-64402007000200014

6. Lao L, Bergman S, Hamilton GR, Langenberg P, Berman B. Evaluation of acupuncture for pain control after oral surgery: a placebo-controlled trial. Arch Otolaryngol Head Neck Surg. 1999;125(5):567-72. doi:10.1001/archotol.125.5.567

7. Ribeiro D. Dental acupuncture: A technique against pain. São Paulo: Ícone; 2002.

8. Kitade T, Ohyahu H. Analgesic effects of acupuncuture on pain after mandibular wisdom tooth extraction. Acupunct Electrother Res. 2000;25(2):109-15.

9. Zijlstra FJ, van den Berg-de Lange I, Huygen FJ, Klein J. Anti-inflammatory actions of acupuncture. Mediators Inflamm. 2003;12:59-69.

10. Karst M, Winterhalter M, Münte S, Francki B, Hondronikos A, Eckardt A, et al. Auricular acupuncture for dental anxiety: a randomized controlled trial. Anesth Analg. 2007;104(2):295-300.

11. Rosted P, Bundgaard M, Gordon S, Pedersen AML. Acupuncture in the management of anxiety related to dental treatment: a case series. Acupunct Med. 2010;28(1):3-5.

12. Sari E, Sari T. The role of acupuncture in the treatment of orthodontic patients with a gagging reflex: a pilot study. Br Dent J. 2010;208(10):E19-E.

13. National Institutes of Health Public Health Service USDoH, Human S. Acupuncture: Consensus Development Conference Report. Journal of Pharmaceutical Care in Pain & Symptom Control. 1998;6(4):67-90. doi:10.1300/J088v06n04_05

14. Rosted P, Bundgaard M, Fiske J, Pedersen A. The use of acupuncture in controlling the gag reflex in patients requiring an upper alginate impression: an audit. Br Dent J. 2006;201(11):721-5.

15. Wong LB. Acupuncture in dentistry: its possible role and application. Proceedings of Singapore Healthcare. 2012;21(1):48-56.

16. Junior WCR, Esteves A, Serpeloni AL, Freitas JFB, Costa GdSFd. Use of acupuncture in the treatment of temporomandibular dysfunction. Revista Internacional de Acupuntura. 2019;13(3):76-81. doi:https://doi.org/10.1016/j.acu.2019.10.001

17. Rosted P, Bundgaard M, Pedersen AM. The use of acupuncture in the treatment of temporomandibular dysfunction--an audit. Acupunct Med. 2006;24(1):16-22. doi:10.1136/aim.24.1.16

18. List T. Acupuncture in the treatment of patients with craniomandibular disorders. Comparative, longitudinal and methodological studies. Swed Dent J Suppl. 1992;87:1-159.

19. Urits I, Charipova K, Gress K, Schaaf AL, Gupta S, Kiernan HC, et al. Treatment and management of myofascial pain syndrome. Best Practice & Research Clinical Anaesthesiology. 2020;34(3):427-48.

20. Cao Q-W, Peng B-G, Wang L, Huang Y-Q, Jia D-L, Jiang H, et al. Expert consensus on the diagnosis and treatment of myofascial pain syndrome. World journal of clinical cases. 2021;9(9):2077.

21. Lavelle ED, Lavelle W, Smith HS. Myofascial trigger points. Anesthesiol Clin. 2007;25(4):841-51.

22. Alvarez DJ, Rockwell PG. Trigger points: diagnosis and management. Am Fam Physician. 2002;65(4):653-61.

23. Shen YF, Younger J, Goddard G, Mackey S. Randomized clinical trial of acupuncture for myofascial pain of the jaw muscles. J Orofac Pain. 2009;23(4):353.

24. Weiss AL, Ehrhardt KP, Tolba R. Atypical facial pain: a comprehensive, evidence-based review. Current pain and headache reports. 2017;21:1-5.

25. Clarkson E, Jung E. Atypical facial pain. Dental Clinics. 2020;64(1):249-53.

26. Ernst E, Pittler MH. The effectiveness of acupuncture in treating acute dental pain: a systematic review. Br Dent J. 1998;184(9):443-7. doi:10.1038/sj.bdj.4809654

27. Cho SH, Whang WW. Acupuncture for temporomandibular disorders: a systematic review. J Orofac Pain. 2010;24(2):152-62.

28. Wolff A, Fox PC, Porter S, Konttinen YT. Established and novel approaches for the management of hyposalivation and xerostomia. Curr Pharm Des. 2012;18(34):5515-21. doi:10.2174/138161212803307509

29. Berk LB, Shivnani AT, Small W, Jr. Pathophysiology and management of radiation-induced xerostomia. J Support Oncol. 2005;3(3):191-200.

30. von Bültzingslöwen I, Sollecito TP, Fox PC, Daniels T, Jonsson R, Lockhart PB, et al. Salivary dysfunction associated with systemic diseases: systematic review and clinical management recommendations. Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, and Endodontology. 2007;103:S57. e1-S. e15.

31. Pedersen A, Sørensen C, Proctor G, Carpenter G, Ekström J. Salivary secretion in health and disease. J Oral Rehabil. 2018;45(9):730-46.

32. Mathison R. Submandibular salivary gland endocrine secretions and systemic pathophysiological responses. Open Inflamm J. 2010;3:9-21.

33. Kahn ST, Johnstone PA. Management of xerostomia related to radiotherapy for head and neck cancer. Oncology (Williston Park). 2005;19(14):1827-32; discussion 32-4, 37-9.

34. Cohen AJ, Menter A, Hale L. Acupuncture: role in comprehensive cancer care--a primer for the oncologist and review of the literature. Integr Cancer Ther. 2005;4(2):131-43. doi:10.1177/1534735405276419

35. de Vasconcelos FHP, de Vasconcelos Catão MHC, Pereira FG, Janoca MÍG, Segundo JHGA, Florentino VGB. Acupuntura Em Odontologia: Uma Revisão De Literatura Acupuncture In Dentistry: A Literature Review. Revista de Atenção à Saúde. 2011;9(28).

36. Dawidson I, Angmar-Månsson B, Blom M, Theodorsson E, Lundeberg T. The influence of sensory stimulation (acupuncture) on the release of neuropeptides in the saliva of healthy subjects. Life Sci. 1998;63(8):659-74.

37. Ghazzaoui SF, Romano LTC, Gonnelli FAS, Palma LF. Acupuncture for xerostomia and low salivary flow rate: a literature review. Rev Bras Odontol. 2016;73(4):340-3.

38. Johnstone PA, Peng YP, May BC, Inouye WS, Niemtzow RC. Acupuncture for pilocarpine-resistant xerostomia following radiotherapy for head and neck malignancies. International Journal of Radiation Oncology* Biology* Physics. 2001;50(2):353-7.

39. Furness S, Bryan G, McMillan R, Worthington HV. Interventions for the management of dry mouth: non-pharmacological interventions. Cochrane Database Syst Rev. 2013(8).

40. Chen J, Shi H, Gao W, Li X, Shu Y, Wang Y, et al. Effect of the staging comprehensive treatment with acupuncture-moxibustion on Bell's facial palsy in the acute stage. Zhongguo Zhen jiu= Chinese Acupuncture & Moxibustion. 2024;44(1):51-6.

41. Li D, Tao L, Wei X, Cai W, Shen W. Acupuncture and Traditional Chinese Medicine in the Treatment of Peripheral Facial Palsy Caused by Wisdom Tooth Extraction: A Case Report. Complementary Medicine Research. 2023;30(6):553-8.

42. Edwards JW, Shaw V. Acupuncture in the management of trigeminal neuralgia. Acupunct Med. 2021;39(3):192-9.

43. Yun J-M, Lee S-H, Cho J-H, Kim K-W, Ha I-H. The effects of acupuncture on occipital neuralgia: a systematic review and meta-analysis. BMC Complementary Medicine and Therapies. 2020;20(1):1-11.

44. Yu Z, Shen M, Shang W, Wu J, Xuan L. Timing of acupuncture treatment in peripheral facial paralysis: a systematic review and meta-analysis. Comput Math Methods Med. 2021;2021.

45. Zhang X, Feng S, Xiong Y, Deng X, Dai A, Zhou Y, et al. Multi-center and randomized controlled clinical study of electro-acupuncture intervention in the treatment of Bell's facial paralysis. Medicine: Case Reports and Study Protocols. 2021;2(7):e0121.

46. Zhao Q, He G, Zhang Z, Li Z. Efficacy and safety of acupuncture for trigeminal neuralgia: A protocol for systematic review and meta-analysis. Medicine (Baltimore). 2020;99(40):e22589. doi:10.1097/md.0000000000022589

47. Liu X. Inhibiting pain with pain— A basic neuromechanism of acupuncture analgesia. Chinese Science Bulletin. 2001;46(17):1485-94. doi:10.1007/BF03187038

48. Wang T, Sui Z, Xia TC, Wen G, Xia Y. Acupuncture Treatment for Pain: Clinical and Laboratory Research. In: Xia Y, editor. Translational Acupuncture Research. Cham: Springer International Publishing; 2019. p. 249-307. 978-3-030-16089-0.

49. Manente R, Pedroso GL, Gomes EMAP, Borsatto MC, Corona SAM. Laser acupuncture in the treatment of neuropathies in dentistry: a systematic review. Lasers Med Sci. 2023;38(1):92. doi:10.1007/s10103-023-03754-w

50. Pomeranz B, Han J, Stux G, Pomeranz B, Tsou K, Takeshige C, et al. Scientific Bases of Acupuncture: Springer Berlin Heidelberg; 2012. 9783642737572.

51. Kavoussi B, Ross BE. The neuroimmune basis of anti-inflammatory acupuncture. Integr Cancer Ther. 2007;6(3):251-7. doi:10.1177/1534735407305892