

# Acupuncture and Dentistry

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**Objectives** Acupuncture is one of the best known complementary therapies in Traditional Chinese medicine and has a history of more than 2500 years. Acupuncture stimulates the nervous system and shifts the perception of pain signals and also releases natural painkillers, such as endorphins and serotonin. Main aim of this article is to review related articles that have focused on acupuncture and its applications in dentistry. The other objective is to maintain a quick sketch of acupuncture use in dentistry for dental clinicians and to encourage them to use acupuncture with the knowledge of its advantages and disadvantages. Dental clinicians have to be familiar with the applications of acupuncture for dental disorders because its successful use for dental conditions has been proven.

**Methods** A detailed search was performed to identify systematic reviews and research/original and review articles, using PUBMED, EBSCO, GOOGLE SCHOLAR and CDSR from 1990 to 2017 in both languages English and Persian to clarify the application of acupuncture in dentistry.

**Results** Various studies have shown that acupuncture can be used to manage wide range of disorders in dentistry such as dental pain, altering pain threshold, myofascial pain, temporomandibular disorders, gag reflex, dental anxiety, chronic muscle pain or spasm, TMD, Atypical facial pain, Headache (tension headache, migraine), (dry mouth), Nerve pain (neuralgia, especially trigeminal neuralgia, neuropathic pain, nerve injury), Paresthesia or anesthesia of the oral and perioral structures. However acupuncture's ability as dental analgesia or controlling post-operative pain after dental surgery as a single therapy is questionable.

**Conclusion** On the systemic review of acupuncture-associated articles in Cochrane library, previously effective acupuncture therapy lacks adequate evidences, which may be related to the low quality of randomized controlled trials (RCTs) in this context.

**Keywords** Acupuncture Analgesia, Acupuncture Points, Xerostomia, Acupuncture Therapy

## Introduction

One of the best-known complementary and alternative therapies is traditional Chinese acupuncture that has a history of more than 2500 years.<sup>1-3</sup> Acupuncture's 'acu' means needle and 'punctura' means to puncture. Traditional Chinese acupuncture defines this method as a stimulation of specific points along the skin of the body involving various methods such as penetration by thin needles.<sup>4</sup>

The stimulation of these points is possible through different methods such as penetration by needles or without needles with various methods include the use of electrical, magnetic, light and sound energy, cupping and moxibustion (the burning on or over the skin of selected herbs), to normalize physiologic functions or to treat various conditions of the human body.<sup>5</sup> So, acupuncture can also be used in different definitions including: (a) Traditional body needling, (b) Moxibustion, (c) Photo acupuncture, (d) Electro-acupuncture (EA), (e) Microsystem acupuncture, such as ear, face, hand, and scalp acupuncture, (f) Acupressure (the application of pressure at selected sites on the body).<sup>6</sup>

The World Health Organization (WHO) approved the use of acupuncture to treat 43 symptoms of disease in 1979, this was exactly what Wong discussed few years after.<sup>5</sup> In 1996, which was extended to 64 conditions of treatment.<sup>1</sup>

To determine the efficacy of acupuncture in managing chronic orofacial disorders there have been numerous studies. Different studies have proven the efficacy of

acupuncture in oral and facial disorders. Experiments have shown that acupuncture results are more effective than placebo effect,<sup>7</sup> however ineffectiveness of acupuncture is seen in a limited number of studies.<sup>4</sup>

### *Mechanism of Action*

Acupuncture works through making stimulations at definite points of whole body. During this therapy, thin steel needles are inserted into the specific areas.<sup>8</sup> Acupuncture basically acts by stimulating the nervous system, altering the way of nervous system procession also it changes pain signals and release natural painkillers like serotonin and endorphins through nervous system.<sup>9</sup>

New scientific researchers have indicated the following application of acupuncture: modulating various physiologic functions, inducing analgesia, regulating the limbic-Paralimbic-neocortical network, enhancing local microcirculation, protecting the body from different kinds of infection.

The therapeutic action of acupuncture is brought about through its regulatory actions on various systems, so it can be regarded as a nonspecific therapy with a broad spectrum of indications, particularly in functional disorders.<sup>9</sup>

### *Advantages and Disadvantages*

Acupuncture has many advantages as follows:

1. An informal therapy
2. Safe because it is nontoxic
3. Minimal adverse reactions
4. No dependency as associated with narcotics
5. Simple and convenient if performed by a well-trained

- practitioner
6. It makes the patient feel relaxed physically and mentally
  7. It increases the endorphins in the blood flow consequently the pain release effects appear
  8. It eliminates toxins and because of increasing local circulation of blood it makes the wounds heal faster<sup>6, 10-15</sup>

The disadvantages of acupuncture include:

1. More time consuming
2. In many cases, may fail to bring about complete analgesia
3. Not appropriate for children, because few children will tolerate the needling
4. Cannot be used effectively in needle-phobic patients
5. Lack of sufficient literature and scientific evidence
6. Requires educated clinicians
7. The sense of burning after therapy
8. The possibility of spreading infection and contaminant due to using non sterile needles
9. Insertion of needle to an inaccurate area causes bleeding, infection and unpleasant feeling
10. Not for use for patient who has bone fracture<sup>11-15</sup>

## Materials and Methods

The study originated from a need to explain the importance of acupuncture's application in dentistry. A detailed search was performed to identify systematic reviews and research articles, using PUBMED, EBSCO, GOOGLE SCHOLAR and CDSR from 1990 to 2017 in both languages English and Persian. Key search terms were acupuncture in dentistry, Myofacial pain, temporomandibular disorders, xerostomia, dental pain and gag reflex.

### Acupuncture in Dental Disorders

Acupuncture can be used effectively in dental conditions includes: Dental pain, Dental anxiety and gag reflex, Temporomandibular joint (TMJ) pain or temporomandibular disorder (TMD), TMJ clicking and locking, Chronic muscle pain or spasm, Atypical facial pain, Headache (tension headache, migraine), Xerostomia (dry mouth), Nerve pain (neuralgia, especially trigeminal neuralgia, neuropathic pain, nerve injury), Paresthesia or anesthesia of the oral and Para-oral Structures.<sup>16</sup>

### Review of Clinical Trials

#### 1. Acupuncture for dental pain

The National Institutes of Health (NIH) Consensus Statement on Acupuncture of November of 1998, states that acupuncture's results have been shown effective for postoperative dental pain.<sup>17</sup> Acupuncture could alleviate dental pain through the ways bellow:

1. Stimulating the nerves located in muscles and other tissues, which leads to release of endorphins and other neuro-humoral factors (e.g., neuropeptide Y, serotonin)<sup>18-23</sup>
2. Changing processing and perception of pain in the

brain and spinal cord.<sup>18-24</sup>

3. Reducing the cardiovascular reflex elicited by toothache (this is associated with the adrenergic system).<sup>26</sup>
4. Increasing the release of adenosine, this has anti-nociceptive properties.<sup>26</sup>
5. Modulating the activity of the limbic-paralimbic-neocortical network.<sup>27</sup>
6. Reducing inflammation, by promoting release of vascular and immunomodulatory factors.<sup>28-29</sup>
7. Increasing local microcirculation.<sup>24</sup>

The results of researches such as those belong to Ernest, Goddard, Chapman, Bensoussan indicate that acupuncture is effective in dental pain.<sup>17, 30, 31, 33-34</sup>

#### 2. Acupuncture for Dental Anesthesia

Acupuncture can act as an adjunct for maintaining anesthesia during dental procedures. The onset time for regional anesthesia after administration of prilocaine hydrochloride is 2 minutes.<sup>35</sup> The results of studies show that administration of acupuncture is effective in accelerating the induction time after a nerve block, increasing dental pain threshold and the duration of anesthesia.<sup>36-38</sup>

#### 3. Acupuncture for Postoperative Dental Pain

Dental surgeries result in morbidity, including pain, swelling, and trismus, which are associated with an intense inflammatory response.<sup>39</sup> Postoperative pain and swelling are usually controlled by administering drugs to patients before and after surgery. Nonsteroidal anti-inflammatory drugs (NSAIDs) are commonly used in this situations. However, these drugs have their own specific adverse effects.<sup>40-41</sup>

The researchers such as Kitade and Travers concluded that acupuncture controlled postoperative pain following dental surgery.<sup>39, 42, 43, 44</sup> Conversely, there are studies showing no effect in alleviating dental pain.<sup>45-46</sup> Ekblom *et al.* showed that acupuncture administration before or immediately after surgical removal of impacted mandibular third molars raised pain levels during postoperative period.<sup>47</sup>

#### 4. Anti-Inflammatory Action

A review article by Zijlstra suggested a hypothesis for the anti-inflammatory action of acupuncture which was related to the insertion of acupuncture needles that stimulates release of b-endorphins (calcitonin gene related peptide [CGRP] and substance P).high levels of CGRP have been shown to be pro-inflammatory, CGRP in low concentrations produces potent anti-inflammatory actions. So in the conclusion a frequently applied "low-dose" acupuncture treatment could provoke a continuous release of CGRP with anti-inflammatory activity, without stimulating pro-inflammatory cells (29, 48-51).

#### 5. Acupuncture and dental Anxiety and the Gag Reflex

Different controlled trials have indicated that ear acupuncture is as effective as intranasal midazolam for reducing dental anxiety and reducing the gag reflex.<sup>48, 52</sup> The anti-gagging point located on the ear corresponds with

the skin of the external acoustic meatus (innervated by the auricular branch of the vague nerve) and that adjacent to the auricle (innervated by the auriculo-temporal branch of the mandibular division of the trigeminal nerve). Both the vague and trigeminal nerves have branches responsible for the sensory and motor function of the larynx, pharynx, and palatal region. It can be postulated that stimulation of the anti-gagging auricular acupuncture point may inhibit the muscular activity, thus reducing the gag reflex.<sup>53</sup> The results of researchers such as Karst, Sari, Kavoussi indicate that application of acupuncture for active gag reflex and alleviating dental anxiety is very effective and practical.<sup>28, 51, 54</sup>

#### 6. *Acupuncture and Temporomandibular joint disorders*

The TMJ joint is the most complex joint in the body and is often predisposed to degenerative changes and pathologies as seen in other synovial joints. Symptoms usually associated with TMD include pain at the TMJ, generalized orofacial pain, chronic headaches and ear aches, jaw dysfunction, including hyper- and hypo-mobility, limited movement or locking of the jaw, painful clicking or popping sounds with opening or closing of the mouth, and difficulty with chewing or speaking.<sup>56</sup>

Therapeutic role of acupuncture for structural anomalies such as degenerative changes and disk displacement has not been proven.<sup>6, 30</sup> It has been documented that acupuncture can help muscle relaxation and reduce muscles spasms, if the spasms are indeed muscular in origin.<sup>57</sup>

Anterior disc displacements are the most common cause of joint clicking. Some anterior disc displacements may be related to lateral-ptyergoid muscle dysfunction due to lateral pterygoid's attachment to the anterior articular disc. Hyperactivity of the superior head of the muscle is capable of pulling the disc forward from its normal position over the mandibular condyle. Acupuncture decrease TMJ clicking by relaxing the lateral pterygoid muscles and thereby reducing TMJ clicking.<sup>58</sup> Various studies have shown that acupuncture is effective in improving TMJ disorders.<sup>1, 57</sup>

Myofascial pain disorders syndrome is one of the disorders associated with TMJ. Repetitive activities of muscle or trauma cause abnormal stress on specific muscle groups which result in patients complain of tenderness, headaches, restricted movement of jaws, muscle stiffness, and weakness which affect quality of individual's life.<sup>59</sup> Various therapies such as medication, physio-therapy, laser-therapy and acupuncture have been studied for alleviating the symptoms.<sup>60</sup> Some researchers have noticed the therapeutic effect of acupuncture in this field.<sup>61, 62</sup>

#### 7. *Acupuncture and atypical facial pain (AFP)*

The term atypical facial pain is used to describe patients whose response to neurosurgical procedures is not typical (40). There are different opinions for the cause of these pains; one of them has been applied to definite AFP as a psychologic disorder (30).

Acupuncture stimulates the nervous system and causes the

release of some neurochemical messenger molecules which influence the body's homeostatic mechanisms, thus promoting physical and emotional well-being of patients. Stimulation of specific acupuncture points has been shown to affect areas of the brain known to reduce sensitivity to pain and stress.<sup>63, 64</sup>

According to Hansen's study acupuncture's pain release effect was significant in comparison with placebo.<sup>59</sup>

#### 8. *Acupuncture and xerostomia*

Xerostomia is decreased or arrested salivary secretion caused by various local or systemic factors. The use of acupuncture therapy as an alternative treatment for xerostomia has been documented since the 1980s.<sup>65</sup> Various researchers have suggested possible hypotheses, including: 1) Acupuncture therapy produces a release of neuropeptides, affecting blood flow with anti-inflammatory properties and trophic effects on the salivary-gland acini. 2) Neuronal activations; activation of the parasympathetic nerves increases salivary secretion. 3) Acupuncture therapy may tap into the neuronal circuit, which activates the salivary nuclei in the pons and subsequently, the salivary glands via the cranial nerves.<sup>66</sup>

Results of studies such as those belong to Johnston, Furness have showed that acupuncture is effective for treating xerostomia for those who receive head and neck radiotherapy but the mechanism of acupuncture in increasing saliva rate has not been proven.<sup>67, 68</sup>

#### 9. *Acupuncture and neural disorders*

Acupuncture can be used to manage a wide range of neuronal disorders, such as facial palsy, trigeminal and other neuralgias, paresthesia or anesthesia of the lower lip following lower-third molar extraction, post-herpetic neuralgias and other conditions.<sup>69</sup>

Acupuncture for treating Bell's palsy is based on the TCM concept that needle manipulation at both the local and distal sites can regulate the flow of Qi in the meridians, harmonize Qi-Blood balance, and strengthen the body's resistance to External Wind pathogens. Acupuncture may also help to increase the excitability of nerves and to promote regeneration of nerve fibers. The relationship between acupuncture and the autonomic nervous system. According to TCM, acupuncture is believed to modulate the imbalance between the parasympathetic and sympathetic activity.<sup>70</sup> Some local acupuncture points used for facial palsy include a point located near the angle of the mandible at the prominence of the masseter muscle and a point located at the depression between the zygomatic arch and the mandibular notch. These two points are found to be anatomically close to branches of the facial nerve.<sup>71</sup> The results of Silva's study indicated that acupuncture is effective for treating Bell's palsy.<sup>69</sup> Results of other study showed that efficacy of prednisolone in combination with staging acupuncture in the recovery of the affected facial nerve, is more effective than prednisolone alone.<sup>72</sup>

## Discussion

Acupuncture is a beneficial traditional technique that can be employed in dentistry. Numerous studies have shown the benefits of acupuncture applied to multiple conditions affecting the head and neck, particularly for chronic conditions.<sup>1, 57, 61, 62</sup> Acupuncture is used for managing dental anxiety and postoperative pain following surgical removal.<sup>73, 34, 43, 44</sup>

Pomeranz stated that needle activation of A-delta and C afferent nerve fibers in a muscle sends signals to the spinal cord, where dynorphin and enkephalins are released and continue to the midbrain, triggering excitatory and inhibitory mediators in the spinal cord. Ensuing release of serotonin and norepinephrine into the spinal cord leads to pain conduction being inhibited both pre- and post-synaptically in the spinothalamic tract. Finally, these signals arrive at the hypothalamus and pituitary glands, triggering release of adrenocorticotropic hormones and b-endorphin. The above therapeutic effects might occur because of modulation of the limbic-paralimbic-neocortical network.<sup>18</sup>

Acupuncture has been used in China and other Eastern cultures for thousands of years to elevate good oral health. One of the therapeutic roles of acupuncture is in the head and neck area. Various clinical trials concluded that acupuncture could play a promising role in complementing conventional treatment modalities because it is generally safe and nontoxic, and produces very negligible adverse reactions. Research has been performed, and there has been some recognition of acupuncture's therapeutic effects, even

though the mechanisms for these effects are still not understood completely.<sup>28</sup>

Acupuncture is a traditional empirical medicine, and evidence-based medicine (EBM) is a new medical method. Since 1990s, researchers began to use the methods and principles of EBM to guide acupuncture clinical research and practice. Now more and more domestic acupuncture clinicians use and follow the methods and principles of EBM.

## Conclusion

On the systemic review of acupuncture-associated articles in Cochrane library, previously effective acupuncture therapy lacks adequate evidences, which may be related to the low quality of randomized controlled trials (RCTs) in this context. In the future, only developing specialized team of acupuncture clinical research and clinical research center can cardinaly enhance the levels of acupuncture clinical research and evaluation. Meanwhile, developing acupuncture should base itself on the characteristics of acupuncture, such as emphasis on original research in ancient books, high-quality single RCTs and systemic review of non-randomized researches (74).

## Conflict of Interests

None Declared ■

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