

# Auricular Acupuncture in the Treatment of Xerostomia

## Abstract

Xerostomia, abnormal dryness of the mouth due to decreased secretion of saliva, is a distressing condition which can significantly impair quality of life in sufferers. In this article, the aetiology, pathology and treatment of xerostomia by Western medicine is discussed and existing studies into its treatment by acupuncture are reviewed. The author then describes the treatment of seven xerostomia patients who were treated using a simple acupuncture protocol. Actual outcomes exceeded the author's expectations with all patients reporting an increase in salivary flow and the ability to eat and speak, as well as improved sleep.

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## Introduction

Xerostomia, abnormal dryness of the mouth due to decreased secretion of saliva, is a distressing condition which can significantly impair quality of life in sufferers. As well as dryness of the mouth, it is associated with rampant dental caries, oral mucosal infections, difficulty in speaking, eating, and swallowing, ulceration or soreness of the oral cavity, altered sense of taste and difficulty in wearing dentures<sup>1</sup>. Xerostomia affects approximately one quarter of the population and approximately 40% of adults over 50<sup>2</sup>. In a study of elderly individuals living in retirement homes, it was found that three quarters were using at least one medication for xerostomia<sup>3</sup>.

## Aetiology

A number of different factors can give rise to xerostomia.

- It is commonly found as a side effect of medications, especially opioids, diuretics, anticholinergic drugs and antihistamines.
- It can be caused by endocrine disorders and autoimmune diseases such as Sjogren's syndrome.
- More than 120,000 patients annually are diagnosed with cancer of the head and neck in the USA<sup>4</sup> and their treatment by radiotherapy gives rise to xerostomia in almost all cases<sup>5</sup>.
- Cancer patients generally exhibit a high prevalence of xerostomia. According to a 1999 study, more than 70% of seriously ill cancer patients suffered from xerostomia<sup>6</sup>.

It is thought that the decreased salivary secretion among xerostomia patients is due to atrophy of the secretory cells of the salivary gland and/or dysfunctional changes in the vascular and connective tissues of the salivary glands<sup>7</sup>. Studies have reported that salivary production usually does not improve for xerostomia patients and that there is a gradual decrease in salivary gland function<sup>8,9</sup>.

## Treatment

Treatment for xerostomia is primarily palliative and includes promoting saliva production by increasing water consumption, using sugarless mints and gum or salivary substitutes, and utilising prescription medications such as oral pilocarpine<sup>10,11</sup>. Treatment results have been short-term at best. Pilocarpine therapy has been found to be ineffective for a high percentage of patients (30-70% in one study) and may give rise to adverse reactions such as sweating, dizziness, headache, rhinitis, nausea, urinary frequency, tachycardia and visual impairment<sup>12</sup>.

Amifostine has been used during radiation therapy via intravenous injection in an attempt to minimise the possibility of xerostomia (as well as mucositis) occurring during treatment through protection against radiation by the scavenging of free radicals. However, amifostine's impact on the efficacy of the radiation treatment (due to possible tumour protection) is controversial because there is the possibility that the drug may protect the tumour from the radiation treatment. In addition, the potential for adverse reactions is significant. Nausea, vomiting, hypertension and allergic reactions were the most common side effects, with 53% of those patients who received amifostine experiencing at least one episode of nausea and/or vomiting<sup>13,14</sup>.

## Acupuncture and xerostomia

### Existing studies

Previous studies have demonstrated that acupuncture might serve as an effective long-term approach to the treatment of xerostomia and can significantly reduce untoward effects<sup>15,16</sup>.

The use of acupuncture as a treatment for xerostomia was first reported by the Western medical literature in 1981<sup>17</sup>, and since 1992, Blom et al have published numerous articles concerning the effectiveness of acupuncture in its treatment<sup>1,9,15,18</sup>. A 1997 study showed a significant increase in saliva (compared to baseline levels) both during and after manual acupuncture

stimulation. By contrast, electroacupuncture had no effect<sup>19</sup>. In a 1992 study, patients suffering from severe xerostomia, primarily associated with Sjogren's syndrome and other systemic disease, were randomly divided into treatment and control groups to determine the effect of acupuncture on salivary flow rates<sup>18</sup>. The control group patients received placebo treatment through superficial intradermal placement of acupuncture needles. Patients in the treatment group exhibited improved salivary flow rates both during and after treatment. These results lasted throughout the one-year post-treatment observation period. While salivary flow rates improved for patients in the control group during the experiment, these changes disappeared after the placebo acupuncture treatment was completed<sup>18</sup>.

A long-term study by Blom and Lundberg followed 70 patients who had been treated with acupuncture for xerostomia due to primary and secondary Sjogren's syndrome, irradiation and other causes. Patients were needled at local points including Juliao ST-3, Daying ST-5, Jiache ST-6, Xiaguan ST-7, Tianrong SI-17, Futu L.I.-18, Yifeng SJ-17 and Baihui DU-20, and distal points including Shenmen HE-7, Neiguan P-6, Sanjian L.I.-3, Hegu L.I.-4, Quchi L.I.-11, Waiguan SJ-5, Zusanli ST-36, Sanyinjiao SP-6, Zulinqi GB41, Taichong LIV-3, Taixi KID-3 and Shuiquan KID-5. All patients received a minimum of twelve and a maximum of fifteen needles. Results acquired over an observational period as long as three years indicated that acupuncture improved salivary flow rates. Compared to patients who chose not to continue acupuncture, the rates remained consistently higher for patients who received an additional series of 5-12 acupuncture treatments, as needed<sup>9</sup>. A 1999 study of patients in a hospital-based home care setting investigated how acupuncture affected patients in late-stage palliative care with symptoms of xerostomia and related problems. The results indicated that "acupuncture had a dramatic effect on xerostomia and subsequently on dysphagia and articulation."<sup>6</sup>

Patients with xerostomia due to radiation therapy for head and neck cancer have shown increased salivary flow rates after acupuncture treatment<sup>15</sup>. Patients who had received more than 50 Gy of radiation were assigned at random to a treatment group receiving real acupuncture or a control group receiving placebo (superficial) acupuncture. Both groups showed a significant increase in salivary flow rates during the one-year observation period, although the control group demonstrated both a smaller and slower improvement. The results of this study show the difficulty in using superficial acupuncture as a placebo.

### Possible mechanisms of action of acupuncture

It has been suggested that acupuncture increases the release of neuropeptides and stimulates the autonomic nervous system, enhancing salivary secretion both in healthy subjects and those with xerostomia. Radio immunoassay analysis has been used to examine xerostomia patients and has determined that acupuncture significantly increases both vasoactive intestinal polypeptide (VIP) and calcitonin gene-related peptide (CGRP) in their saliva<sup>1,19,20</sup>.

Both the sympathetic and parasympathetic nervous systems influence the function of salivary glands and the rate and nature of salivary flow. Sensory, sympathetic and parasympathetic nerve fibres innervate the salivary glands. Sympathetic system stimulation produces a low, viscous, protein-rich flow of saliva while parasympathetic system stimulation has the primary influence on salivary secretion and yields a strong increase of salivary flow with a low protein content<sup>21,22</sup>.

Acupuncture has also been shown to increase blood flow to the skin overlying the parotid gland. Blom et al studied a group that had received acupuncture and a control group that had received superficial acupuncture. Using laser Doppler flowmetry, they discovered that blood flow to the skin overlying the parotid gland increased significantly (both during and after acupuncture) for the experimental (acupuncture) group<sup>23</sup>.

### A new acupuncture treatment for xerostomia

Most of the treatment provided in research that relates to acupuncture and xerostomia has involved placing needles at numerous points both locally (in the area of the major salivary glands) and distally (that is, on the arms and legs). In some studies, the number of treatment sessions has ranged from 20-24<sup>9,24</sup>.

In recent years, an acupuncture treatment protocol for xerostomia has been developed that involves fewer acupuncture points and a great reduction in the number of treatment sessions<sup>5,16</sup>. This protocol limits the number of acupuncture points to three on each ear and one on each index finger, reducing the total number of needles used from 14-24 to 8. The average number of treatments also has been reduced from 20-24 to approximately 6<sup>5,16</sup>.

The xerostomia inventory (XI) is an instrument that is utilised to evaluate a patient's subjective sensation of dry mouth<sup>25,26</sup>. Johnstone et al used the XI to demonstrate a significant improvement in the symptoms of xerostomia as perceived by patients after treatment with the minimally invasive acupuncture protocol described above<sup>5,16</sup>.

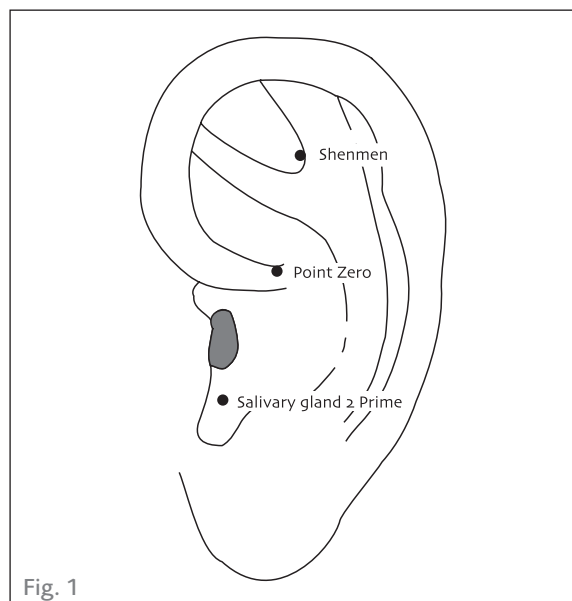


Fig. 1

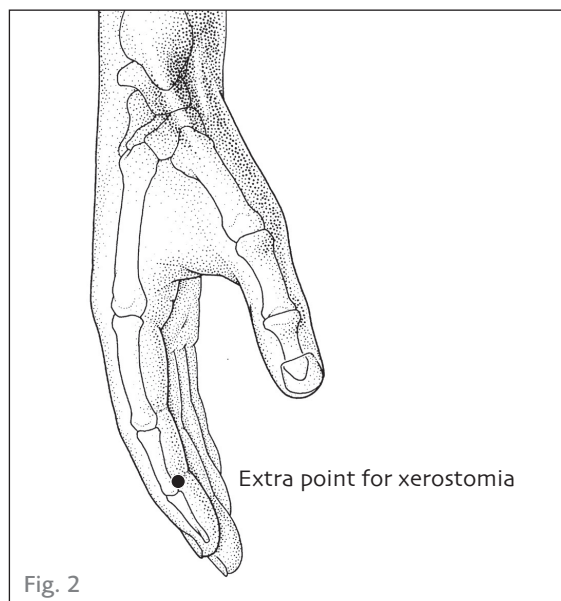


Fig. 2

### Case reports

Seven patients with xerostomia subsequent to head and neck radiation therapy were referred to the author for acupuncture. Six of the patients had undergone surgery prior to receiving radiation therapy, five for squamous cell carcinoma of the tongue and one for squamous cell carcinoma of the ear. The seventh patient received radiation therapy without surgery for nasopharyngeal cancer. The time between the completion of radiation therapy and the initiation of acupuncture treatment ranged from two months to ten years, with a median of nine months.

Three of the patients were men and four were women, ranging in age from 41-62, with an average age of 51.5 and a median age of 59. Two of the patients had not used pilocarpine to stimulate salivary secretion, while two had stopped using it due to adverse reactions and a lack of effectiveness. Three patients who had been taking pilocarpine at the time of their first acupuncture visit decreased usage and subsequently stopped it during and after the acupuncture treatment. Two patients received amifostine initially during radiation therapy but discontinued it due to severe nausea and vomiting.

Patients typically came to their first acupuncture appointment with a bottle of water and, on occasion, a bottle of artificial saliva. All of the patients reported suffering from the xerostomia-related symptoms discussed earlier. In addition, all of the patients awoke frequently throughout the night to drink water. During each patient's first visit, the need for a rigorous oral hygiene home care/prevention program was discussed. At that time, the patient received written information describing various artificial saliva products and medications designed to help patients suffering from xerostomia<sup>27</sup>. Patients were

advised to work closely with their oral health care professionals to develop an appropriate programme.

These seven patients were treated with the acupuncture protocol developed by Niemtzw<sup>5,16</sup>. Three points were needled on each ear: Shenmen (to calm the mind, reduce inflammation and hypersensitivity and to support other auricular points<sup>28</sup>), point Zero (designed to bring about homeostasis<sup>29</sup>), and Salivary Gland 2/Prime. In addition, an extra point was needled bilaterally at the radial end of the distal phalangeal crease of the index finger, on the border of the red and white skin. Patients were given sugarless mints during treatment to help stimulate salivary flow, although the mints usually produced little, if any, saliva without the use of acupuncture.

Patients were usually treated once a week for four to five weeks, followed by two or three biweekly sessions, each treatment session lasting 45-50 minutes. The number of treatment sessions for the seven patients ranged from 6-14, with a mean of 8 visits. Salivary flow often improved during the first visit and the duration of improvement increased with each subsequent visit. In the eight months after treatment, all of the patients continued to report a reduction in the symptoms of xerostomia, the need to awaken at night for water and difficulty in eating and swallowing. Increases were reported in the flow of saliva, the ability to speak for longer periods of time and the ability to eat a wider range of food.

Studies have demonstrated that although acupuncture increases the volume of saliva, salivary flow does not reach the full level exhibited prior to radiation treatment<sup>5,16</sup>. While all of the patients in this study have reported being pleased with the results of treatment to some degree, none of the patients reported 100% return of saliva.

Fig. 1: Auricular acupuncture points.

Fig. 2: An extra point for xerostomia.

Both before the start of treatment and at its completion, patients were asked to subjectively rate their level of salivary flow against their pre-radiation/presurgery level. These levels were rated with a Visual Analog Scale (VAS), in which 0 indicated no saliva and 10 indicated a level of saliva equivalent to pre-radiation/ pre-surgery treatment levels. VAS scores prior to acupuncture treatment ranged from 0.0-2.5, with a mean score of 0.86. VAS scores after acupuncture treatment ranged from 2.5-7.0, with a mean score of 3.5. One patient reported that the increased flow of saliva was intermittent instead of continual, while another patient reported that sugarless mints were necessary to stimulate maximum salivary flow.

### Conclusion

All of the patients treated by the author, including those patients inconvenienced by the need to travel from surrounding states for their appointments, have indicated that they were pleased they elected to pursue acupuncture treatment for their xerostomia. For these patients, xerostomia was only part of a series of traumatic life events with potentially serious physical and emotional consequences. Others included the diagnosis of a

malignancy, surgical intervention, radiation treatment, pain, disfigurement and dysfunction. Acupuncture could play a significant role in enhancing the quality of life of these individuals and others suffering from xerostomia as well as many of the sequelae of cancer and its treatment. ■

### Note

The acupuncture protocol used in this study was developed by Dr. Richard Niemtzw. More information on the treatment is available at <http://www.n5ev.com>

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