

# The effect of acupuncture in the treatment of patients with primary Sjögren's syndrome

## A controlled study

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Twenty-one patients, 20 women and 1 man, participated in a controlled study. All patients were diagnosed with primary Sjögren's syndrome (1°SS) according to the Copenhagen and San Diego criteria. The patients were randomly assigned to either a group receiving acupuncture treatment or a control group with no active treatment. The patients in the control group received acupuncture after 10 weeks when the acupuncture treatment was completed in the first group. A majority of the patients subjectively reported some improvement after treatment, and a significant increase in paraffin-stimulated saliva secretion was found after treatment. No statistically significant differences between the acupuncture group and the control group were seen in unstimulated salivary secretion or most of the subjective variables. The study showed that acupuncture is of limited value for patients with 1°SS. □ *Randomized trial; saliva secretion; salivary glands; sensory stimulation; xerostomia*

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Primary Sjögren's syndrome (1°SS) is an autoimmune chronic inflammatory disease of the connective tissues characterized by lymphatic infiltration of the exocrine organs (1). The disease leads to a reduction in glandular function with symptoms of mouth dryness (xerostomia) and eye dryness (keratoconjunctivitis sicca) (2). These symptoms can also occur together with other autoimmune diseases of the connective tissues, such as rheumatoid arthritis, and can be diagnosed in these cases as secondary Sjögren's syndrome (2°SS). The reduction in salivary secretion leads to difficulties in speaking and swallowing and results in an increased risk for infections in the mucous membranes of the mouth and rapidly progressing caries (3, 4). The symptoms often are very severe and lead to a reduction in the quality of life. At present there is no effective treatment for mouth dryness. Local treatment with saliva replacements or saliva-stimulating agents gives only temporary relief (5). In one controlled study of patients with xerostomia of various origins, an increased secretion of saliva was shown up to 1 year after the completion of acupuncture treatment (6). In patients with 1°SS or 2°SS, Doppler flowmetry has shown an increase in the blood flow in the skin over the parotid glands during acupuncture treatment (7). Other studies have shown that the effects of acupuncture on blood flow and salivary secretion are probably related to the release of neuropeptides (8).

The aim of the present investigation was to evaluate the subjective and objective effects on salivary secretion

following acupuncture treatment in patients with 1°SS in a controlled study.

## Materials and methods

### *Patients*

Thirty-four patients who had been previously diagnosed with 1°SS (according to the Copenhagen and San Diego criteria and the proposed criteria by the European Community study group (9)) by specialists in oral medicine, ophthalmology, and rheumatology were asked to participate in the project. Twenty-one patients, 20 women and 1 man, ranging in age from 44 to 78 years (mean age, 65 years), participated in the investigation. They were informed about the study and its aims according to the guidelines of the Declaration of Helsinki.

### *Treatment*

At the first visit a clinical investigation was made, including registrations of salivary secretion rates and an examination for temporomandibular disorders (TMD). The patients were randomized into two groups. Group 1 (10 patients) received acupuncture, and group 2 (11 patients) acted as controls during the time group 1 received treatment (Fig. 1). At the completion of acupuncture treatment in group 1 (10 weeks), a new saliva

measurement was made in both groups. Group 2 then received acupuncture treatment and was followed up as group 1 had been previously. The evaluation was performed by one person, treatment by another.

#### Clinical variables and saliva analysis

**Salivary secretion rate.** The registration of the salivary secretion rate was performed by two methods: measurement of unstimulated saliva (15 min), followed by measurement of paraffin-stimulated whole saliva (5 min). Before the measurements the patients were informed about the method and purpose of the registration. The patients were instructed not to smoke, eat, or drink 1 h before measurement. During salivary registration the patients were sitting in a normal position. Patients with dentures wore them at the time of sampling (10).

**Labial salivary gland (LSG) biopsy.** The LSG biopsies were made in the lower lip, and five to eight glands were removed for histopathologic examination. Focal lymphocytic inflammation with a focus score  $>1$  per  $4 \text{ mm}^2$  was equated with autoimmune sialadenitis (11). All the biopsies had been performed previously as part of the initial examination (4).

#### Subjective variables

Before and after the acupuncture treatments and control periods (10 weeks), both groups answered questions concerning their discomfort. In three of the questions, the patients were asked to report their degree of discomfort from mouth dryness, eye dryness, and tongue and mouth burning on a 10-point visual analogue scale (VAS) with the end definitions 'no discomfort at all' and 'maximum discomfort'. Two of the questions were concerned with the impact on daily living. One of these was related to limitations of mandibular functioning. Each patient was asked to report the degree of reduction in speech and chewing on a scale of 0 to 10 with the end definitions 'activity without any discomfort at all' and 'activity impossible due to discomfort'. In the second question the patients were asked to make a global estimate of the reduction in daily activities on a scale of 0 to 10 with the end definitions 'not at all' and 'extreme' (12). After completed treatment the patients were asked to report their subjective experience of the treatment effect on a 6-point scale (completely well, much better, somewhat better, unchanged, somewhat worse, or much worse) (13).

#### Acupuncture treatment

Each patient received treatment twice a week for 10 weeks. Each treatment lasted approximately 30 min. The needles were placed intramuscularly, mainly in the regions of the parotid, submandibular, and labial glands. The following acupuncture points were stimulated: segmentally localized—ST 6, ST 7, TE 23, BL 2, CV23, CV24, GV20, GV26, Biantao, Quianzheng; and non-segmentally

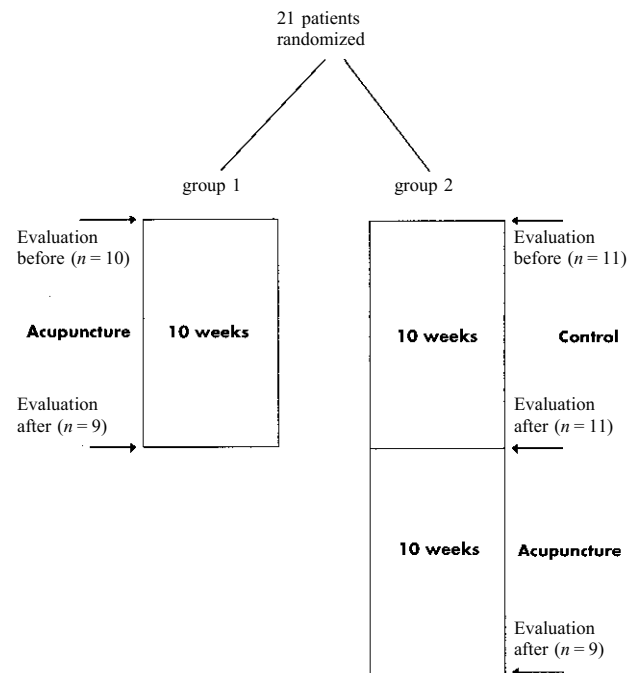


Fig. 1. Schematic diagram of the course of treatment for the 21 patients participating in the study.

localized—ST 36, LI 4, KI 3 (14). Of these acupuncture points, ST 6, ST 7, TE 23, BL 2, Biantao, and Quianzheng were stimulated bilaterally. The remaining points were stimulated unilaterally. In group 1 all of the needles were manually stimulated except for ST 7 and Biantao, which were stimulated electrically with a low-frequency (2 Hz) bipolar current, evoking visible muscle contractions. Group 2 received manual stimulation of all the acupuncture needles. During manual stimulation of the needles, *de'qi* (a feeling of diffuse muscle pain), numbness, or warm sensation was strived for (15). The manual stimulation was repeated four times during each treatment session.

#### Statistics

The Wilcoxon matched-pairs signed-ranks test was used to analyze the differences within the groups before and after treatment. The Mann-Whitney U-test was used to analyze differences between the groups. The Pearson product-moment correlation test was used to evaluate the association between salivary secretion rate and focus score. Two-tailed statistical tests were performed with a significance level of 0.05.

#### Results

The 21 patients participating in the study did not differ significantly from the rest of the 34 patients registered

Table 1. Unstimulated saliva and paraffin-stimulated saliva: median (minimum and maximum) values before and after acupuncture treatment of group 1 and no-treatment group 2

		Group 1	Group 2	<i>P</i>
Unstimulated saliva (mL/15 min)	Before	0.0 (0.0–0.2)	0.0 (0.0–0.7)	NS
	After	0.0 (0.0–0.6)	0.0 (0–0.2)	NS
	<i>P</i>	NS	NS	
Paraffin-stimulated saliva (mL/5 min)	Before	0.6 (0.0–1.2)	0.5 (0.0–2.4)	NS
	After	1.2 (0.05–2.6)	0.6 (0.1–2.5)	NS
	<i>P</i>	≤0.05	NS	

NS = not significant.

with 1°SS regarding unstimulated saliva, age, or sex. Three patients did not complete their course of treatment because of general illness not related to the treatment.

Before treatment 16 of the 21 patients displayed no unstimulated saliva. Five patients exhibited <0.3 mL/5 min paraffin-stimulated saliva. The median values for unstimulated saliva and paraffin-stimulated saliva are given in Table 1. A statistically significant increase of paraffin-stimulated saliva was seen in group 1 following acupuncture treatment. No statistically significant difference between the groups before or after treatment could be found. Of the 18 patients treated with acupuncture, 6 had an increase in the rate of unstimulated salivary secretion, and 7 had an increase in paraffin-stimulated salivary secretion.

A generally high degree of discomfort was subjectively reported for the variables mouth dryness, eye dryness, and burning sensation in the mouth (Table 2). After treatment a statistically significant reduction in the subjective experience of mouth dryness ( $P \leq 0.05$ ) was found for group 1. After treatment there was no statistically significant difference in the subjective variables between the groups (Table 2). Concerning the consequences of the illness for chewing and speech or other daily activities, no significant reduction in function could be registered. Before and after treatment, there were no statistically significant differences between or within the groups.

In group 2 no significant changes were noted in the registration of secretion rates before or after acupuncture

treatment. After acupuncture a significant reduction in discomfort in the eyes was registered. All of the other subjective variables exhibited no significant difference (Table 3).

The patients' subjective evaluations of the treatment results in both groups are shown in Table 4. Of 18 patients treated with acupuncture, 14 reported some form of improvement.

No significant correlation was found between unstimulated and stimulated secretion rates and focus score in the biopsies.

## Discussion

In Östergötland County in Sweden, with a population of approximately 400,000, only 34 patients over the last 2 years were diagnosed with 1°SS by specialists according to the previously defined criteria. All of these patients were asked to participate in the study; approximately 60% consented. These patients did not differ from those who did not participate with regard to salivary secretion, sex, or age. Furthermore, this group seems to be representative since the age and sex distributions are in agreement with those of other studies (4, 16, 17). The design of the study was to determine if acupuncture, compared with no treatment, could be a useful therapy to treat patients with 1°SS. The patients were treated according to Western diagnosis, with a selection of acupuncture points localized

Table 2. Subjective evaluation (VAS) of discomfort caused by mouth dryness, eye dryness, and burning sensation in the mouth: median (minimum and maximum) values before and after acupuncture treatment of group 1 and no-treatment group 2

		Group 1	Group 2	<i>P</i>
Mouth dryness	Before	7.2 (4.5–10.0)	6.3 (0.0–9.5)	NS
	After	5.5 (3.2–10.0)	6.8 (0.0–9.5)	NS
	<i>P</i>	≤0.05	NS	
Eye dryness	Before	7.0 (1.0–9.8)	7.8 (3.2–9.5)	NS
	After	5.0 (1.5–9.5)	7.0 (2.5–9.5)	NS
	<i>P</i>	NS	NS	
Burning sensation in the mouth	Before	3.2 (0.0–10.0)	4.5 (0.0–9.5)	NS
	After	1.5 (0.0–10.0)	2.8 (0.0–4.6)	NS
	<i>P</i>	NS	NS	

NS = not significant.

Table 3. Subjective evaluation of discomfort caused by mouth dryness, eye dryness, and burning sensation in the mouth; reduction in speech and chewing ability; and the effect on daily activities in group 2: median (maximum and minimum) values before and after acupuncture treatment

	Before	After	P
Mouth dryness	6.8 (0.0–9.5)	4.0 (0.5–7.1)	NS
Eye dryness	7.0 (2.5–9.5)	4.7 (0.5–8.0)	≤0.01
Burning sensation in the mouth	2.8 (0.0–4.6)	2.0 (0.0–7.0)	NS
Speech and chewing ability	6.0 (0.0–9.0)	4.0 (1.0–7.0)	NS
Daily activities	3.0 (0.0–8.5)	1.0 (0.0–7.0)	NS

NS = not significant.

mainly in the affected gland tissue. Non-segmental points also were used, since this treatment procedure has been found to be most efficacious for pain and xerostomia (18, 19).

In the present study it was found that the patients had a significant increase in paraffin-stimulated saliva after acupuncture. However, no difference was found between these patients and the no-treatment control group. No improvement in unstimulated saliva was found in either group. Furthermore, a significant reduction in subjective mouth dryness was found in the treatment group.

Despite the insignificant values for unstimulated saliva, the results from our study are in accordance with those of Blom et al. (6), who found that, in a group of patients with xerostomia of various causes, 4 of the 11 patients that had been treated with acupuncture showed an improvement both at the end of treatment and at the 1-year follow-up. The same study found a subjective improvement in reported mouth dryness in the acupuncture group after treatment. In this group of patients with various causes of mouth dryness, only 1 patient had 1°SS. No improvement was noted for this patient. In another study in which 20 patients with xerostomia caused by radiotherapy received acupuncture, a significant improvement in the acupuncture group as compared with the control group could be shown at the 1-year follow-up (19). Blom et al. (7) noted that patients with 1°SS and 2°SS experience an increase in blood flow locally over the parotid gland after acupuncture treatment. The effect was especially marked in patients who had previously experienced increased salivary secretion after acupuncture.

A significant increase of non-stimulated saliva during and after acupuncture has been shown in healthy individuals (8). It is probable that the increases in blood flow and salivary secretion rate are related to the release of vasoactive neuropeptides (20). This assumption has been confirmed by a study that found an increase in blood flow after acupuncture and an increased amount of calcitonin gene-related peptide and vasoactive intestinal polypeptide in saliva during acupuncture treatment (8). It can therefore be stated that acupuncture treatment appears to affect salivary secretion rates in different populations to different degrees. A prerequisite for effective treatment was manual stimulation. Electric stimulation did not cause an improvement in non-stimulated secretion, but resulted in a

significant reduction of the stimulated secretion of saliva (8). In our study we could find no difference between manual stimulation and a combination of manual and electric stimulation.

In our study 5 patients exhibited extremely low values of paraffin-stimulated saliva (<0.3 mL/5 min). Only 1 of these patients responded to acupuncture with increased saliva secretion. However, of 13 patients with (>0.3 mL/5 min) paraffin-stimulated saliva, 6 responded to acupuncture. This suggests that chewing-stimulated saliva could facilitate the selection of patients for acupuncture. It further suggests that a prerequisite for an effect is that some function in the salivary glands remains. Hypothetically, both physical exercise and acupuncture activate the same types of muscle-afferent nerve fibers (21). This would suggest that normal salivary function is dependent on regular chewing. It is also possible that the effects of acupuncture are attributable to changes in the sympathetic tone of the autonomic nervous system, which thereby affect salivary secretion. Several studies have found that afferent input in somatic nerve fibers has a significant effect on autonomic functions (22, 23).

A subjective reduction of eye dryness was registered in group 2 after acupuncture. Similar results for individual patients were reported in an earlier study of patients who received acupuncture for xerostomia (6). To date, however, no systematic studies have been conducted to evaluate whether acupuncture is capable of stimulating the lacrimal glands.

In the present study many patients reported discomfort from burning sensations in the mouth and tongue, which is in accordance with other studies (4, 24, 25). The etiology of burning sensations in the mouth and tongue seems to be complex, involving several interacting factors (4, 26, 27). In

Table 4. Subjective evaluation of treatment effect in groups 1 and 2

	No. of patients
Completely well	0
Much better	3
Somewhat better	11
Unchanged	3
Somewhat worse	1
Much worse	0

our study no improvement was reported in the acupuncture group. Similar findings have been reported by others (28).

Primary SS is a chronic autoimmune disease in which not only the salivary and lacrimal glands are affected but a number of extraglandular manifestations occur. Even though the majority of patients reported some form of improvement and the paraffin-stimulated saliva increased significantly after acupuncture treatment, no statistically significant improvement could be registered for unstimulated saliva or most of the subjective variables. The results can only partly be explained by local effects such as an increased sense of moisture in the mouth or the general side effects of relaxation and improved sleep, which are often reported in connection with acupuncture treatment (6, 29). Another possible explanation is the non-specific effect related to the treatment situation and care.

The conclusion of the study is that acupuncture appears to have little or no treatment effect on the salivary secretion flow of patients with 1°SS. However, positive effects in the form of subjectively determined improvement were noted by the majority of patients after treatment.

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