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## Efficacy of Acupuncture and Vitamin C in Burning Mouth Syndrome: A Pilot Study.

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### ABSTRACT

Burning mouth syndrome (BMS) is a chronic oral painful condition characterized by symptoms of burning in the oral mucosa, usually affecting the tongue in perimenopausal woman. Despite the extensive research, adequate treatment options are still lacking. The aim of this study was to compare efficacy of acupuncture and vitamin C in patients with BMS. Prior to the either therapy as well as after four weeks of therapy every participant fulfilled following questionnaires (STAI, OHIP-14, HAMILTON and VAS). A total of 42 patients were included (21 patients received acupuncture- 3 times during one week for four weeks on the points ST 8 (stomach- tou wei), GB 2, TE 21, SI 19 (small intestine- ting gong), SI 18 (small intestine- quan liao), LI 4 (large intestine-yuan) on both sides of the body as well as GV 20 (Governing vessel-bai hui), and other 21 patients received vitamin C-1g was administered after meal, 3 times during the day for four weeks). Significant decrease of STAI, OHIP-14, HAMILTON and VAS scores in patients treated with acupuncture was obtained. No significant reduction of the same scores in patients treated with vitamin C. It seems that acupuncture is beneficial in patients with BMS.

**Keywords:** acupuncture, burning mouth syndrome, treatment, vitamin C.

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## INTRODUCTION

Primary burning mouth syndrome (BMS) is chronic oral painful condition which mostly affects middle-aged and elderly women and is characterized by burning symptoms in the mouth without any other local or systemic signs of illness. Aetiology of primary BMS is still unknown [1]. Considering the fact of unknown aetiology, treatment options for burning symptoms remains unsatisfactory. Since recent research studies have detected that alteration of the mucosal blood circulation might play a role in the burning mouth symptoms, acupuncture has been promoted as possible therapeutic approach [2, 3, 4]. Thermographic methods have shown vasomodulatory effect of acupuncture on the microcirculation, not only at surface layer of the skin but also in deeper areas [5, 6]. The evidence obtained through the spectroscopy and fluxometry has demonstrated increase in the speed of the blood flow, as well as modify the perfusion in the microcirculation [7, 8]. Therefore, we thought that traditional Chinese acupuncture might be also helpful in these patients as we and other authors showed beneficial effects previously [9, 10, 11, 12].

On the other hand, Tatullo et al. [13] reported the effectiveness of antioxidant treatments in the patients affected by BMS. Ascorbate is a powerful reducing agent capable of rapidly scavenging a number of reactive oxygen species, therefore it is an antioxidant, protecting against oxidative stress [14]. The biological role of ascorbate is to act as a reducing agent, donating electrons to various enzymatic and a few non-enzymatic reactions. The one- and two-electron oxidized forms of vitamin C, semidehydroascorbic acid and dehydroascorbic acid, respectively, can be reduced in the body by glutathione and NADPH-dependent enzymatic mechanisms [15, 16]. Furthermore, vitamin C acts as an electron donor for several different enzymes, for example dopamine beta hydroxylase participates in the biosynthesis of norepinephrine from dopamine [17, 18]. So far, there is only one report on the Pubmed upon efficacy of vitamin C in patient with BMS [19].

The aim of the study was to evaluate the efficacy of acupuncture and vitamin C in BMS.

## MATERIALS AND METHODS

This study was approved by Ethical Committee of the School of dental medicine in Zagreb. Prior to the study every participant signed informed consent according to the Helsinki II. All 42 participants with the diagnosis of primary BMS were recruited from the Department of Oral medicine, School of dental medicine in Zagreb. Patients were randomized by simple randomization method- flipping a coin (heads - acupuncture, tails - vitamin C).

Inclusion criteria were burning symptoms in the oral cavity with clinically healthy appearance of the oral mucosa; and absence of local and/or systemic factors which can cause burning symptoms of the oral mucosa (excluded by complete blood count, serum iron, vitamin B12, folic acid, blood glucose and thyroid hormones). The exclusion criteria were inability to understand the text of the informed consent and the text of the questionnaires.

Traditional Chinese acupuncture was performed on 21 participants 3 times during one week for four weeks on the points ST 8 (stomach- tou wei), GB 2, TE 21, SI 19 (small intestine- ting gong), SI 18 (small intestine- quan liao), LI 4 (large intestine-yuan) on both sides of the body as well as GV 20 (Governing vessel- bai hui) and each session lasted half an hour. We used sterile acupuncture needles from surgical stainless steel silicone coated with spring handle, the dimensions of the chosen needles were 0.25 in diameter and 30 mm length, inserted at the depth of the 0.5-1 cun. The elicited response was of the type "de qi" accompanied by redness and a feeling of numbness around the needles.

For the 21 participants treated with vitamin C, 1g was administered after meal, 3 times during the day for four weeks.

Prior to the either therapy as well as after four weeks of therapy every participant fulfilled questionnaires. The intensity of burning symptoms and discomfort was determined using a 100 mm visual analogue scale (VAS) and „Oral health impact profile“(OHIP-14) before and after four weeks of therapy. The State-Trait Anxiety Inventory (STAI) questionnaire was used to measure the presence and severity of current

symptoms of anxiety and propensity to be anxious. To rate the severity of depression in patients, HAMILTON rating scale was used.

Statistical analysis included Student t test and p values lower than 0.05 were considered significant.

### RESULTS

A total of 42 patients were evaluated and randomized. Twenty-one patients received acupuncture, and other 21 received vitamin C for their treatment of burning symptoms. Demographic features and number of the patients are shown in the Table 1.

**Table 1. Demographic features of the patients treated with acupuncture and vitamin C.**

	No. of participants	Age ±SD
ACUPUNCTURE		
Men	2	64.1±8.2
Women	19	61.2± 12.3
C VITAMIN		
Men	3	63±7.6
Women	18	65±11.8

There were no statistically significant differences between the two groups with regard to the age and gender.

Results from the analysis of the assessment scales of the patients treated with acupuncture are shown in the Table 2.

**Table 2. Data from the assessment scales of the patients treated with acupuncture.**

	BEFORE ACUPUNCTURE	AFTER ACUPUNCTURE	p value
STAI	56.7±12.1	46.2±15.4	0.021
OHIP-14	28.2±9.6	18.3±7.4	0.029
HAMILTON	16.1±5.6	12.2±4.7	0.037
VAS	6.1±3.8	4.6±2.7	0.041

\*p<0.05

Student t test showed significant decrease of STAI, OHIP-14, HAMILTON and VAS values in the group of patients treated with acupuncture (p=0.02; p=0.029; p=0.037, p=0.041, respectively).

**Table 3. Data from the assessment scales of the patients treated with vitamin C.**

	BEFORE VITAMIN C	AFTER VITAMIN C	p value
STAI	57.2±10.3	54.1±16.1	0.056
OHIP-14	27.4±8.4	24.3±10.5	0.061
HAMILTON	17.1±4.8	14.2±7.2	0.059
VAS	6.5±2.7	5.7±4.1	0.067

\*p<0.05

Student t test showed no significant reduction of STAI, OHIP-14, HAMILTON and VAS values in the group of patients treated with vitamin C (p=0.056; p=0.061; p=0.059, p=0.067, respectively).

### DISCUSSION

The results of this study showed that acupuncture was efficient in patients with BMS, however, vitamin C partially decreased results of all performed tests. This finding was not significant, showing higher

standard deviation which implies higher variability between the participants treated with vitamin C. Therefore, it seems that individual response to vitamin C was noticed, i.e. in some patients vitamin C was beneficial, while in others it did not have any beneficial effect.

It is interesting to note, that some BMS patients have some kind of the deficiency of dopamine system which was shown in the previous studies [20, 21]. As vitamin C serves as an electron donor needed for the biosynthesis of norepinephrine from dopamine, it seems that in some BMS patients, probably with dopamine deficiency, vitamin C increases dopaminergic effects. Recently, Tatullo et al. [13] measured total oxidant capacity and biological antioxidant potential as iron-reducing activity in 18 patients with BMS. The same authors [13] concluded that antioxidant therapies might be useful in patients with BMS. The mechanism by which acupuncture acts on BMS is not known. Probable mechanisms include stimulation of blood circulation, release of neuropeptides, etc. The results of the previous studies have certainly showed a beneficial effect in BMS patients. Yan et al. [11] searched Cochrane Oral Health Group Trials Register (July 2011), Cochrane Central Register of Controlled Trials (issue 7, 2011), MEDLINE (1966 to June 2011), and electronic medical database from the China-National Knowledge Infrastructure (1979 to June 2011) to find out publications regarding acupuncture and BMS. Finally, nine studies with 547 randomized patients were included. These articles claimed efficacy of acupuncture/acupoint injection therapy in BMS patients. Sardella et al. [10] analyzed 10 BMS patients in which acupuncture treatment lasted 8 weeks (20 sessions). Patients reported a mean reduction in pain which was significant. No significant improvement in the overall score for quality of life was observed, although BMS patients better coped with their symptoms. Scardina et al. [2] treated 30 patients with BMS and reported that acupuncture affects oral microcirculation, and leads to the significant reduction of the burning symptoms after three weeks of therapy. Therapeutic response lasted for the next 18 months. Lately, we have reported that acupuncture and clonazepam were both efficient in patients with BMS [9].

Significant decrease of STAI, OHIP-14, HAMILTON and VAS scores in patients treated with acupuncture was obtained, while there was no significant reduction of the same scores in patients treated with vitamin C. However, individual response to vitamin C was noticed, i.e. in some patients vitamin C was beneficial, while in others it did not have any beneficial effect. We might conclude that acupuncture is beneficial in patients with BMS.

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