

## Comparison of Burning Mouth Syndrome Prevalence and its Related Factors between Menopausal and Non-Menopausal Women

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### Abstract

**Introduction:** Burning mouth syndrome (BMS) is defined as burning and pain in the oral mucosa usually without any clinical and laboratory findings. It has a negative effect on patients' quality of life and can be a significant health problem. The aim of this study was to identify major risk factors associated with BMS in menopausal and non-menopausal women at dental clinics of Gorgan, Iran. **Methods:** This cross-sectional study was performed on 450 elderly female patients attending Gorgan dental clinics, Iran. Questionnaires were completed for all the patients by the examiner. For those with burning mouth, intraoral examination was performed to make sure of lacking any clinical pathoses. In addition to descriptive statistics, t-student, Chi-square, Fisher exact test, Mann-Whitney U tests, and Logistic Regression were used for data analysis. **Results:** In total, 13.8% of patients (n=62) suffered from BMS. Level of education (OR=4.67) and menopause (OR=4.45) were found to be as predictors of increased prevalence of BMS in women of 30 to 60 years of age. According to Logistic Regression analysis, educational level, menstrual status, antidepressants, and systemic disease were significantly related to BMS. **Conclusion:** The prevalence of BMS among women in Gorgan (Iran) was relatively high, and the major risk factors were high level of education and menopause.

**Key words:** Burning mouth syndrome, menopause, women.

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### Introduction

Burning mouth syndrome (BMS) is a frequent burning sensation in the tongue or other parts of the mouth along with xerostomia or dysgeusia without any unusual clinical and laboratory findings for at least 4 to 6 months (1,2). Other symptoms such as tingling and numbness were also reported (3). The prevalence of this condition is in the range of 0.7 to 14.8% (1, 4-7).

This condition is observed in middle-aged and old individuals in an age range of 37 to 78 years. The prevalence in females is seven times more than males in a way that 18-38% of menopause females demonstrate burning mouth symptom (8). BMS can be related to menopause (9,10). Considerable reduction in levels of estrogen and hormonal imbalance stimulates pain fibers and leads to bitter taste in the mouth (4,11).

There are three types of BMS. In type one, there are no symptoms after wakening from sleep, but pain and burning sensation is intensified during the day and is persistent every day. This type of BMS is associated with systemic diseases such as diabetes and nutritional deficiencies. Patients with type two BMS, have burning sensation throughout the day from morning until the end of the day. Mood and personality disorders, sleep disturbances, and changes in diet habits are also observed. In type three, patients have a burning

sensation infrequently in some days, which is associated with allergy and anxiety (2,12,13).

Factors responsible for developing this syndrome are local factors (allergy, oral infections, parafunctional habits, smoking, alcohol consumption), systematic factors (diabetes, hypothyroidism, menopausal hormonal changes, and medications) and psychological (stress, anxiety, depression, and fear from cancer) (2,14,15).

Diagnosis of BMS needs complete medical history, confirmation of symptoms, oral mucosal examination, and if necessary laboratory tests (Vit B12, TSH, FBS, CBC, Ferritin and allergy test) (1,2,16-18). Different treatment methods have been introduced such as tricyclic anti-depressants, antioxidants, estrogen therapy, anticonvulsants, topical capsaicin, pilocarpine and antifungal drugs (2,13-19).

Some studies have been conducted on epidemiologic indices of BMS syndrome, therapeutic methods, salivary flow rate and oral signs in menopause women (20-25). Nevertheless, few studies have been accomplished on identifying risk factors related to BMS in our country. The aim of this study was to compare prevalence of burning mouth syndrome and its related factors in menopausal and non menopausal women in Gorgan, Iran.

## Materials and Methods

A cross-sectional study was designed with a convenient and continuous sampling method in 2010-2011. The study population was comprised of 225 menopausal and 225 non- menopausal women in the age range of 30 to 60 years (average  $44.7 \pm 7.6$  years) visited at two governmental dental clinics of Gorgan city, Iran. As the numbers of the attendants to both clinics were similar, the number of samples selected from each clinic was equal. Informed written consent was obtained from each patient before starting the study.

Information were gathered through the interview and recorded in data sheets consisting of 29 questions about demographics, medical history, general health and specific questions on BMS. The content validity of the questionnaire was verified by authorized lecturers from Oral Medicine Department of Shahid Beheshti Dental School. To measure test-retest reliability, the questionnaire was distributed among 30 patients with a two- week interval, and the Kappa coefficient was calculated as 0.76.

The specific BMS questions were about duration and intensity of burning according to a 10- cm Visual Analogue Scale (VAS), type of BMS, and duration of burning, quality of pain, onset and previous treatments. Thereafter, clinical oral examination was performed in patients with burning symptom in order to rule out the

presence of any oral lesions by a trained senior dental student under light of the dental unit and with sterile dental mirrors. Individuals with oral lesions concurrent with pain and burning were excluded from the study and referred to Babol Dental School for profound diagnosis and treatment. The inclusion criterion for menopausal women was developing menopause normally without any surgical interventions such as ovariectomy.

In addition to descriptive statistics, t-student, Chi-square, Fisher exact, and Mann-Whitney U tests were used to analyze the data. After detection of associated factors, Logistic Regression was performed. Where confounding factors did not have normal distribution, scoring method was implemented. In order to determine the relationship between different variables and burning sensation, odds ratio was calculated. Finally, the most important relevant factors were determined by conditional stepwise method.

## Results

Out of 450 patients, 22.7% (n=51) of menopausal women and 4.8% (n=11) of non-menopausal women were diagnosed with burning mouth syndrome with the average age of  $50.3 \pm 3.4$  years. Total prevalence of BMS was measured as 13.8%. There was no difference regarding average age of menopausal women with or without BMS (t – student Test,  $P = 0.41$ ). However, this difference was significant in non-menopausal women with or without BMS;  $46.6 \pm 2.7$  and  $38.1 \pm 5.6$  respectively (t–student Test,  $P < 0.001$ ).

Frequency of signs and symptoms of BMS along with the results of oral examination in BMS patients is demonstrated in Table 1. Dysphagia (49%) was the most prevalent sign / symptom in menopause patients with BMS, whereas in non-menopause patients xerostomia (45.4%) and dysgeusia (45.4%) were mostly frequent. In addition, the least frequent signs/symptoms in both menopause (13.7%) and non- menopause (9%) patients with BMS were numbness.

The most and the least common sites for pain and burning sensation were anterior two-third of the tongue and floor of the mouth in the above-mentioned groups, respectively (Table 2). There was no significant difference between menopause and non-menopause BMS patients in terms of signs/symptoms. Moreover, except for anterior 2/3 of the tongue, the same results was found in terms of burning site (Chi-square,  $P = 0.001$ ).

The characteristics of pain among BMS patients are summarized in Table 3.

Furthermore, anemia was found as the most common systemic disease in both menopause and non-menopause patients, which followed by hypertension, diabetes, and gastrointestinal problems.

After conducting multiple Logistic Regression Analysis according to conditional stepwise method, the following variables remained as main BMS risk factors:

high level of education (OR=4.67), menopause (OR=4.45), anti-depressants (OR=2.72), and history of medical systemic conditions (OR=1.94) (Table 4).

**Table 1.** Frequency of signs and symptoms among 62 women with BMS

Oral Signs & Symptoms	Menopause	Non- menopause	Total	P-value*
Xerostomia	19 (37.2%)	5 (45.4%)	24 (37.8%)	0.736
Dysguesia	25 (49%)	5 (45.4%)	30 (48.3%)	0.830
Numbness	7 (13.7%)	1 (9%)	8 (12.9%)	0.999
Dysphagia	15(29.4%)	2(18.1%)	17(27.4%)	0.001

\*Chi-square Test

**Table 2.** Frequency of burning sites of 62 women with BMS

Site	Menopause	Non- menopause	Total	P-value*
Anterior 2/3 of tongue	47 (92.1%)	8 (72.7%)	55 (88.7%)	0.001
Lips	12 (23.5%)	3 (27.2%)	15 (24.1%)	0.021
Cheeks	10 (19.6%)	2 (18.1%)	12 (19.3%)	0.499
Oropharynx	8 (15.6%)	3 (27.2%)	11 (17.7%)	0.512
Floor of the mouth	3 (5.8%)	1 (9%)	4 (6.4%)	0.623
Palate	2 (3.9%)	0 (0)	2 (3.9%)	0.499

\* Fisher exact Test

**Table 3.** Pain characteristics among BMS patients

Pain characteristics		Menopause (n=51)	Non-menopause (n=11)	Total	P-value
Quality	burning	49(96.1)	11(100)	60(96.8)	0.999*
	radiating	1(2)	0(0)	1(2)	
	pulsatile	1(2)	0(0)	1(2)	
Pattern	Type I	10(19.6)	2(18.2)	12(19.4)	0.999*
	Type II	13(25.5)	3(27.3)	16(25.8)	
	Type III	28(54.9)	6(54.5)	34(54.8)	
Duration (Months)		17.9±14.8	9.6±3.9	16.4±14.1	0.157**
Intensity (VAS: 10 cm)		5.8	6.3	5.9	0.572***
Timing	All day long	15(29.4)	3(27.3)	18(29)	0.903*
	Evening	27(52.9)	7(63.6)	34(54.8)	
	Night	9(17.6)	1(9.1)	10(16.1)	
Spontaneous onset		41(80.4)	9(81.8)	50(80.6)	0.999*
Relief after drinking fluids		27(52.9)	6(54.5)	33(53.2)	0.923***

\*Fisher exact Test

\*\*Chi-square Test

\*\*\*Mann-Whitney U Test

**Table 4.** Major risk factors of BMS patients

	Position	With BMS	Without BMS	Total	Odds Ratio (OR)	P-Value*
Menstrual Status	Menopause	51 (82.3%)	174 (44.8%)	225 (50%)	4.45	<0.001
	Non-menopause	11 (17.7%)	214 (55.2%)	225 (50%)	1	
Education	Illiterate	9 (14.5%)	118 (30.4%)	127 (28.3%)	1	0.005
	High school	29 (46.8%)	188 (48.5%)	217 (48.2%)	2.43	0.04
	Academic	24 (38.7%)	82 (21.1%)	106 (23.6%)	4.67	<0.001
Systemic Diseases	Yes	43 (69.4%)	187 (48.2%)	23 (51.1%)	1.94	0.049
	No	19 (30.6%)	201 (58.1%)	220 (48.9%)	1	
Anti- depressants	Yes	10 (16.1%)	16 (4.1%)	26 (5.8%)	2.72	0.069
	No	52 (83.9%)	372 (95.9%)	424 (94.2%)	1	

\*Logistic Regression

### Discussion

Prevalence of BMS in the city of Gorgan was estimated to be 13.8 %, which is relatively high and in accordance with Bergdahl and Bergdahl (5), Hackerberg et al. (6), Savage et al. (7) and Scala et al. (8) studies. In addition, this number in menopausal women was determined as high as 22.7% which is similar to Scala et al. (8) (18-38%) and Wardrop et al. (26) studies (43%). According to Baharvand et al. (22), the prevalence of BMS in patients referred to dental schools in the city of Tehran (Iran) was 1.3%. The lower prevalence of BMS in this study may be related to the wide age range of patients in both sexes. In the present study, the average age range in patients with BMS was higher than those without BMS, which implies the higher prevalence of BMS in older females.

More than one third of patients with BMS had xerostomia, similar to studies conducted by Heidari et al. (20) (25.8%), Baharvand and Hemmati (21) (24.2%) and Brailo et al. (27) (36%). In Borhan Mojabi et al. (24) and Ship et al. (28) studies, reduced stimulated and non stimulated salivary flow rate has been reported. Also, Bergdahl and Bergdahl (5), Hackerberg et al. (6), and Granot et al. (29) have mentioned xerostomia in their studies as well.

Dysguesia was present in almost half of the BMS patients and its prevalence was close to Zidverc-Trajkovic et al. (17) and Heidari et al. (20).

The most prevalent site for burning mouth was anterior two-third of the tongue bilaterally (88.7%) with lips and cheeks at the second and third place. These findings were similar to Grushka et al. (1), Bergdahl and Bergdahl (5), Gao et al. (15), Heidari et al. (20), and Baharvand et al. (22) studies.

The average duration of burning was  $16.4 \pm 14.1$  months in this study and reported 23.6 months in Baharvand et al. (22), 2-5 years in Lamey et al. (12) and over 6 months in Hakeberg et al. (6) studies.

The range of pain intensity in our patients was in moderate pain area (3.4 - 6.6) with the average score of 5.9 according to VAS. Baharvand et al. (22) and López-Jornet (30) reported this number as 6.4 and 5.1, respectively.

Most of patients with BMS have stated their pain onset as spontaneous with burning quality similar to Grushka et al. (1) and Baharvand et al. (22) studies. The most prevalent type of pain in both menopausal and non-menopausal women was type three with a frequency of 54.8%. This type of pain is associated with anxiety and allergic reactions (8). Since in the present study more than one third of patients had history of stress and anxiety and one fourth reported background of allergic reactions, the aforementioned prevalence seems reasonable. Furthermore, in Marino's (19) study 13% of patients with BMS had allergic reactions and 69.3% had history of agitation and tension. Gao et al. (15) estimated this figure to be 41.4% and Bakhtiari et al. (31) found a significant level of anxiety in BMS patients.

History of depression was reported in 27.4% of patients with BMS and nearly half of them had sleep disorders. Gao et al. (15) and Bulijan et al. (16) observed 45.2% and 44.1% of depression in their BMS patients. Sleep disorders were reported in 56.3% and 43.8% of patients by Gao et al. (15) and Heidari et al. (20). According to several studies burning and pain in BMS patients can interfere with their sleep and this disturbance can predispose patients to mood disorders such as anxiety, depression and irritability (13,18).

Allergic reactions were reported in nearly half of BMS patients by Heidari et al. (20), Soto-Araya, Pokupec-Gruden, and Nicholson as well (32-34).

Peterson and Heidari et al. (20) reported parafunctional habits in 61% and 60.7% of their BMS patients, respectively (35).

According to Heidari et al. (20) and Jensen and Barkvoll (36), gingival inflammation, dental plaque and calculus can act as local stimulating factors of BMS.

In our study, highly educated women had higher risk of developing BMS. Gao et al. (15) also stated level of education as a risk factor for BMS.

Nearly two-thirds of BMS patients had medical systemic conditions with anemia (33.9%), and high blood pressure (20.9%) as the most prevalent conditions. The high prevalence of anemia and hypertension is rational as the population study was consisted of elderly and middle-aged women. Heidari et al. (20) reported high blood pressure (40.4%) and respiratory diseases (37.1%), as main prevalent conditions in BMS patients.

In this study the multifactorial nature of BMS is once more verified. According to Logistic Regression, higher risks to develop BMS are found among people with high-level education (4.67 times), women in menopause period (4.45 times), patients on antidepressants (2.72 times), and patients with systemic diseases (1.94 times). Several other studies have also demonstrated the complexity of causes in BMS (15,37,38). Past history of medical conditions such as high blood pressure, urogenital and gastrointestinal disorders, medications and psychological disorders have been stated as risk factors in several studies (15,37,38).

Limiting bad oral habits, improving oral health and maintaining good oral health status may help prevent BMS. However in-depth studies based on analytical and causative study designs such as cohort type, strict diagnostic criteria, and proper patient selection and at the same time monitoring confounding factors such as smoking and alcohol use are needed. By providing clear-cut and accurate associations, current knowledge can be applied in a more rational and beneficial way for preventing, treating and managing BMS patients.

### Conclusion

Burning mouth syndrome is relatively high in elderly women in Gorgan (Iran). The major risk factors were high level of education, menopause, antidepressants, and history of medical systemic conditions.

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