

# Preliminary Clinical Study of Initial Screening Blood Test Data on Outpatients with Burning Mouth Syndrome

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## Abstract

**Study background:** The objective of study is a survey to report the prevalence of burning mouth syndrome (BMS) and to evaluate the co-morbidities associated to BMS. **Subjects and Methods:** A total 393 patients (54 males and 339 females; mean age 67 years; age range 27-102) were selected for this study. We carried out initial screening blood tests to these patients. Furthermore, we examined if there were previous and/or present systemic diseases and regularly taken medication by medical interview. **Results:** Female patients over 50 years old accounted for 89.3% (351/393). Dry mouth (330/393: 84.0%) was the most concomitant symptom with BMS. The ratio of abnormal measurements of iron was 35.9% (141/393). Zinc was 12.2% (48/393). However, the higher out-range ratio of MCV was 39.9% (157/393) and the lower out-range ratio of MCV was 8.7% (34/393). The higher out-range ratio of MCH was 36.6% (144/393) and the lower out-range ratio of MCH was 6.4% (25/393). The highest ratio of systematic disease of hypertension was 34.6% (136/393). **Conclusions:** We suspected that pernicious anemia may be most important factor of the BMS. Many patients had a number of systemic diseases and were taking several kinds of medicine. BMS is very complex disease, so it needs that more detailed investigation of systematic disease and habitual drug-taking is also needed.

*Key words: Burning mouth syndrome (BMS), Xerostomia, Dry mouth, Blood test, Outpatients*

## Introduction

Burning mouth syndrome (BMS) refers to chronic orofacial pain, unaccompanied by mucosal lesions or other evident clinical signs. BMS is characterized by an intense burning or stinging sensation, mostly on the tongue or in other areas of the oral mucosa. It can be accompanied by other sensory disorders such as dry mouth (Xerostomia) or taste alterations. It is probably of multifactorial origin, and often idiopathic, with a still unknown etiopathogenesis in which local, systemic and psychological factors are implicated [1-3].

Recently, the aging of society is progressing rapidly. So, many patients with BMS have visited our hospital [4]. However, there are only few clinical reports of initial screening blood test data on outpatients with BMS. The aim of study is a survey to report the prevalence of burning mouth syndrome (BMS) and to evaluate the co-morbidities associated to BMS by medical interview data and initial screening blood examination.

## Methods

This study took place at Osaka Dental University, Japan, (First Department of Oral and Maxillofacial Surgery, Second Department of Oral and Maxillofacial Surgery, Department of Geriatric Dentistry, and Department of Internal Medicine) between April 2010 and May 2014 among patients who visited our outpatient clinic with chief complaint of BMS.

Before initiation treatment was started, all patients were interviewed and examined extra orally and intraorally. Next, we adjusted prostheses; treated dental caries and/or tartar; and prescribed gargle and/or ointment; as necessary. We also took microbiological swabs to rule out intraoral candidiasis. Initial screening blood examination was also taken.

All patients were assessed clinically by a specialist of BMS with medical interview, whose selection of patients for this retrospective study was based on the following criteria for exclusion: age younger than 20 years; idiopathic erosion and/or ulcer of oral mucosa; severe trauma due to dental caries, prosthesis and/or tartar; previous treatment history of BMS; severe periodontal disease; candidiasis infection; history of drug abuse or/and severe psychosis with speech disorder (dementia, schizophrenia, and others).

A total 393 patients (54 males and 339 females; mean age 67 years; age range 27-102) were selected for this retrospective study. We carried out blood tests to these patients under informed consent. All blood tests were carried out more than 2 hours from the last eating and/or drinking. Furthermore, we examined if there were previous and/or present systemic diseases and regularly taken medicine.

All patients underwent haematological investigations consisting of a full blood count, haemoglobin value (Hb), hematocrit value (Ht), erythrocyte sedimentation, mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH), serum iron, zinc, and copper. Mean corpuscular volume (MCV) and mean corpuscular hemoglobin (MCH) were measured using Sysmex (XT-2000i), Serum estimations were undertaken using competitive binding radioassay techniques; the serum iron, zinc and copper were measured by standard autoanalyser methods. All tests which gave results outside the laboratory reference range were repeated and mean values adopted.

## Results

Age distribution and male: female ratio is 54 (13.7%): 339 (86.3%). The total was 393 patients (*Table 1*).

The rate of chief complaints of BMS (Table 2). Dry mouth (330/393: 84.0%) was most concomitant symptom with BMS. Furthermore, taste disorder (39/393: 9.9%) was concomitant symptom.

**Table 1.** Age and sex distribution of patients with BMS. Data are number (%).

Age (years)	Male	Female	Total
0-10	-	-	-
21-30	-	-	-
21-30	-	3	3(0.7)
31-40	-	9	9 (2.3)
41-50	6	24	30 (7.6)
51-60	9	54	63 (16.0)
61-70	15	81	96 (24.4)
71-80	15	126	141 (35.9)
81-90	9	39	48 (12.2)
91-100	-	-	-
101-110	-	3	3 (0.7)
Total	54 (13.7)	339 (86.3)	393 (100)

The rate of abnormal measurements for each data of initial screening blood examination (Table 3). The higher outrange

Age (years)	WBC		RBC		Hb		Ht		MCV		MCH	
	Higher	Lower	Higher	Lower	Higher	Lower	Higher	Lower	Higher	Lower	Higher	Lower
0-10	-	-	-	-	-	-	-	-	-	-	-	-
Nov-20	-	-	-	-	-	-	-	-	-	-	-	-
21-30	-	-	3	-	-	3	-	2	-	3	-	3
31-40	-	-	-	-	-	-	-	-	-	-	6	-
41-50	3	-	12	1	6	4	6	5	3	9	3	9
51-60	9	6	15	3	6	-	12	-	28	9	19	3
61-70	12	3	3	2	12	3	12	2	35	6	42	4
71-80	18	12	3	11	-	2	-	3	55	4	44	6
81-90	-	-	2	17	-	6	3	9	36	3	30	-
91-100	-	-	-	-	-	-	-	-	-	-	-	-
101-110	-	-	-	-	-	-	-	2	-	-	-	-
Total	42/393 (10.7)	21/393 (5.3)	38/393 (9.7)	33/393 (8.4)	24/393 (6.1)	18/39 (4.6)	33/393 (8.4)	23/393 (5.9)	157/393 (39.9)	34/393(8.7)	144/393 (36.6)	25/393(6.4)

**Table 3.** The rate of abnormal measurements for each data examined. Data are number (%).

Results of rate of abnormal measurements for erythrocyte sedimentation and serum concentration (Table 4). The abnormal outrange of erythrocyte sedimentation was 29.7% (117/393). The ratio of abnormal measurements of iron was 35.9% (141/393). Zinc was 12.2% (48/393). Copper was 0.5% (2/393).

of RBC 9.7% (38/393) and the lower outrange of RBC 8.4% (33/393). The higher outrange ratio of MCV was 39.9% (157/393) and the lower outrange ratio of MCV was 8.7% (34/393). The higher outrange ratio of MCH was 36.6% (144/393) and the lower outrange ratio of MCH was 6.4% (25/393).

**Table 2.** The rate of chief complaint of BMS. Data are number (%).

Age (years)	Dry mouth (Xerostomia)	Taste disorder (dysgeusia)
0-10	-	-
20-Nov	-	-
21-30	3	-
31-40	10	-
41-50	27	-
51-60	54	9
61-70	66	18
71-80	126	9
81-90	41	3
91-100	-	-
101-110	3	-

The rate of systemic disease (Table 5). Hypertension was 34.6% (136/393). Hyperlipidaemia was 12.7% (50/393). Diabetes mellitus was 8.7% (34/393). Gastroesophageal reflux disease was 8.1% (32/393).

The rate of taking medicine (Table 6). The ratio of taking of minortanquilizer was 18.6% (73/393). H2 blocker was 8.1% (32/393).

**Table 4.** The rate of abnormal measurements for each data examined. Data are number (%).

Age (years)	Erythrocyte sedimentation	Iron	Zinc	Copper
0-10	-	-	-	-
20-Nov	-	-	-	-
21-30	-	-	3	-
31-40	-	-	-	-
41-50	6	9	-	-
51-60	12	21	6	-
61-70	15	28	9	-
71-80	51	56	15	2
81-90	30	27	15	-
91-100	-	-	-	-
101-110	3	-	-	-
Total	117/393(29.7)	141/393(35.9)	48/393(12.2)	2/393(0.5)

**Table 5.** The rate of systemic disease (hypertension, hyperlipidaemia, diabetes mellitus, gastroesophageal reflux disease) among patients. Data are number (%).

Age (years)	Hypertension	Hyperlipidaemia	Diabetes mellitus	Gastroesophageal reflux disease
0-10	-	-	-	-
20-Nov	-	-	-	-
21-30	-	-	1	-
31-40	-	-	-	1
41-50	3	-	1	7
51-60	42	3	5	3
61-70	73	15	10	13
71-80	18	29	13	18
81-90	-	3	4	5
91-100	-	-	-	-
101-110	3	-	-	-
Total	136/393(34.6)	50/393(12.7)	34/393(8.7)	32/393(8.1)

## Discussion

BMS is a condition characterized by a sensation described by the patient as a stinging burn that affects the oral mucosa, in the absence of clinical or laboratory data to justify these symptoms [2,5-8]. The true prevalence of BMS is difficult to establish due to the lack of rigorous diagnostic criteria in many of the published literature. Thus, figures vary widely, with prevalence varying between 0.7 and 4.5% [2,7].

Bergdahl and Bergdahl [7] reported a randomized study in Sweden using a questionnaire on a group of 1427 (669 males and 758 females) aged between 20 and 69 years. All individuals who reported burning mouth were examined,

finding that 53 patients (3.7%) presented BMS, of which 11 were male (1.6%) and 42 were female (5.5%). Among the males, BMS was not found in the groups aged 20-39 years, while the prevalence in the group aged 40-49 years was 0.7%, increasing to 3.6% in the group of 60-69 year-olds. Among the females, it did not appear in the group 20-29 years of age. In the group of 30-39 years, the prevalence was 0.6%, increasing to 12.2% in 60-69 year olds.

**Table 6.** The rate of taking medicine (minor tranquilizer and H2 blocker) among patients. Data are number (%).

Age (years)	Minor tranquilizer	H2 blocker
0-10	-	-
20-Nov	-	-
21-30	-	-
31-40	-	-
41-50	6	5
51-60	13	4
61-70	18	6
71-80	30	12
81-90	6	5
91-100	-	-
101-110	-	-
Total	73/393(18.6)	32/393(8.1)

In general, the condition principally affects female more than male ratio of approximately 3:1. This gender difference may perhaps be explained by biological, psychological, and sociocultural factors. However, such factors have not yet been defined [1].

In our present study, there were 54 male patients (13.7%) and 339 female patients (86.3%). The total was 393 patients. Males were most common (15 patients) in the 60-69 group and 70-79 group. Females were most common (126 patients) in the 70-79 years of age group. For both males and females patients were most common (141/393; 35.9%) in the 71-80 years of age group.

Danhauer et al. [8] examined 69 patients with BMS (83% women) with a mean age of 62 years, and a mean duration of pain of 2.45 years. In our present study, the mean age of the patients was 67 years.

In previous study, xerostomia is a concomitant symptom in patients with BMS, prevalence varying between 34 and 39%, while Grushka et al. [3] find that this is equal to or greater than 60%.

In our study, dry mouth (330/393: 84.0%) was most concomitant symptom with BMS.

The treatment becomes more complex when the symptoms do not improve after initial treatment (adjustment of a prosthesis, or treatment of dental caries, stomatitis and tartar) and initial screening examinations (microbiological examination for Candida, and haematological assessments of

red blood cell count, packed cell volume, and haemoglobin concentration) [4].

It was reported that systemic factors are implicated in BMS. Many of these are deficiencies, such as vitamin deficiencies (in particular low levels of vitamin B12, and others such as vitamin B6, folic acid and vitamin C), and anemia. Furthermore, some studies suggest that BMS is associated with low serum levels of zinc [1].

Yoshida et al. [4] reported that roughly 10% of the patients were deficient in zinc. The serum concentration of zinc was most important to the patients with tongue pain.

In our study, the higher outrange of RBC 9.7% (38/393) and the lower outrange of RBC 8.4% (33/393). There were many aolocythemia and anemia patients. The higher outrange ratio of MCV was 39.9% (157/393) and the lower outrange ratio of MCV was 8.7% (34/393). The higher outrange ratio of MCH was 36.6% (144/393) and the lower outrange ratio of MCH was 6.4% (25/393). The ratio of abnormal measurements of iron was 35.9% (141/393). Zinc was 12.2% (48/393). As a result, it was important to measure the serum concentration of iron for the relation with BMS. Unfortunately, we could not get the complete data of serum concentration of vitamin B12 in present study. However, we suspected that iron deficiency anemia and pernicious anemia may be most important factor of the BMS.

In previous study, hormonal changes (reduced plasma estrogens), diabetes mellitus, thyroid dysfunction (hypothyroidism) and immunological diseases have also been described [1].

In our study, the ratio of systematic disease of hypertenion was 34.6% (136/393). Hyperlipidaemia was 12.7% (50/393). Diabetes mellitus was 8.7% (34/393).Gastroesophageal reflux disease was 8.1% (32/393).

It was reported that many medications are intimately related with burning mouth among which are found antihistamines, neuroleptics, some antihypertensives, antiarrhythmics and benzodiazepines. Antihypertensives are among the most frequently implicated medicines, principally those that act on the renin-angiotensin system (captopril, enalapril and lisinopril) [1].

In our present study, the ratio of taking of minor tanquilizer was 18.6% (73/393). H2 blocker was 8.1% (32/393).

Cancerphobia can be present in up to 20-30% of patients with BMS. A lower level of socialization and higher levels of somatic anxiety have been observed, as well as muscular tension, a higher tendency to worry about health and greater sadness. BMS is considered a chronic pain disorder that adversely affects quality of life [9].

## Conclusion

Dry mouth was the most concomitant symptom with BMS. Female patients over 50 years old accounted for 89.3% (351/393). The ratio of abnormal measurements of iron was 35.9% (141/393). However, the higher outrange ratio of MCV was 39.9% (157/393) and the lower outrange ratio of MCV was 8.7% (34/393). The higher outrange ratio of MCH was 36.6% (144/393) and the lower outrange ratio of MCH was 6.4% (25/393). As a result, we suspected that pernicious anemia may be most important factor of the BMS. In the BMS, the highest ratio of systematic disease was hypertension.

Many patients had a number of systemic diseases and were taking several kinds of medicine. More detailed investigation of systematic disease and habitual drug-taking is also needed.

## Conflict Of Interest

All authors declare that there are no conflicts of interests.

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