

A STUDY ON THE CLINICAL CHARACTERISTICS OF BURNING MOUTH SYNDROME

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- CONTENTS -

- I. INTRODUCTION
- II. MATERIALS AND METHODS
- III. RESULTS
- IV. DISCUSSION
- V. CONCLUSIONS
- REFERENCES

I. INTRODUCTION

Patients with atypical facial pain are commonly encountered in dental practice. Particularly, many clinicians have encountered patients who complain of a burning sensation in the mouth. Frequently, there are no physical signs present to indicate an underlying pathology. For some patients, the oral burning symptoms are a form of chronic orofacial pain that can be debilitating. The condition described is known as glossodynia, glossopyrosis, or glossalgia, but is commonly referred to as Burning Mouth Syndrome (BMS). Glossodynia is defined as a burning sensation in the tongue from any cause.

However, different studies indicate that other intraoral locations are involved in the pain complaint in about half of the glossodynia patient population.^{1,2)} As a result, burning mouth or burning mouth syndrome has been used as a more encompassing symptom description.³⁾

There had been no universally accepted criteria for the diagnosis of BMS. Conditions like lichen planus and geographic tongue had repeatedly been suggested for etiologic factors of BMS in past times²⁾, but several authors suggest the use of the term BMS only for cases with normal oral mucosa and unremitting burning.^{4,5)} Therefore, the term "Burning Mouth Syndrome" is now widely used an intraoral pain disorder that is unaccompanied by clinical signs.^{6,7)}

The pain and burning symptoms of the mouth have been studied by many authors for a long time. In 1900, Butlin and Spenser first described the causes of this symptom as a neuropathic disposition, dyspepsia or a gouty diathesis, and infection producing reflex burning or pain.⁸⁾ In 1932, Lain suggested

galvanic currents as a cause of mouth burning after the study of 30 patients.⁹⁾ In 1981, Ferguson et al. suggested that decreased estrogen level at menopause could lead to psychologic disturbance and oral discomfort.¹⁰⁾ In 1985, Dorey reported that 15% of the denture wearers had oral burning without clinically detectable abnormalities.¹¹⁾

BMS is not uncommon disorder. The prevalence of burning mouth in dental patients was reported to be 5.1%.¹²⁾ The vast majority of the affected were older than 50 years and female. In a diabetic clinic, 10% of the patients surveyed complained of burning mouth or strange taste.¹²⁾ According to the recent study, an estimated 1.3 million adults in the U.S. civilian population had experienced burning mouth during the past six months.¹³⁾

Symptoms of BMS are oral complaints of burning, tickling or sticking sensation sometimes accompanied by an altered taste sensation.^{14,15)} When patients with BMS describe their symptoms in detail, it becomes clear that burning is not one symptom but rather a term used to describe a variety of symptoms. In addition to the character of these burning sensations, the site and diurnal pattern of intensity of BMS also varies among patients.

Numerous causes of BMS have been suggested. BMS has been attributed to a wide variety of etiologies that may be grouped into three categories: local, systemic, and psychogenic factors. Local etiologic factors include denture problems, and allergic or irritation reactions to dental materials.^{16,17)} Systemic factors include nutritional deficiencies¹⁸⁻²⁰⁾, hormone imbalance^{10,21)}, and hyperglycemia¹²⁾. Psychogenic factors include depression, anxiety, and recent life change events and miscellaneous conditions such as sensory neuropathies.^{22,23)} However, little

objective data substantiate the majority of these causes.

Many authors reported controlled studies that extensively described the clinical features of BMS.^{2,4,24,25)} Yet, relatively little information exist concerning the clinical feature of BMS in a Korean adult population, and treatment of BMS based on one or more of the above mentioned causes is usually unsatisfactory. A major factor in the lack of success of the preceding proposals in explaining BMS is that the features of BMS have never been rigidly characterized.

The purpose of this study is to describe clinical characteristics of this complex syndrome in Korean adults including clinical oral status, medical and dental profiles, hematologic examinations, saliva viscosity, and psychologic evaluation, and to propose a diagnostic protocol for these patients.

II. MATERIALS AND METHODS

1. Patient assesment

A total of 112 patients who had visited the Department of Oral Medicine & Diagnosis, Seoul National University Dental Hospital during the period from July 1993 to September 1994, and determined to have BMS were examined in this study. The patients were 19

Table 1. Demographics of 112 patients with BMS

	No. of patients in age group (years)					
	30-39	40-49	50-59	60-69	70-79	Total
M	5	5	5	3	1	19
F	15	17	34	25	2	93
Total	20	22	39	28	3	112

men with a mean age \pm standard deviation of 49.4 ± 12.0 years and a range of 32 to 70 years; 93 women with a mean age of 53.2 ± 10.9 years and a range of 31 to 78 years. The distribution of the patients by age and sex is shown in table 1.

Diagnosis of BMS was based on a chief complaint of persistent oral burning concomitant with no clinically observable lesions.

2. Clinical evaluation

Pain history, medical and dental questionnaires were administered to 112 BMS subjects and to 92 volunteers who served as age- and sex-matched controls (15 men with a mean age of 48.7 ± 10.0 years and a range of 32 to 64 years; 77 women with a mean age of 53.3 ± 9.0 years and a range of 33 to 62 years). Some questions in the pain history, however, which related specifically to the oral burning pain, were answered by only the BMS patients.

Extraoral and intraoral examinations were also carried out for all subjects. In addition, the hematologic examinations revealed nutritional or systemical problems were done for the part of BMS patients. The examinations included a complete blood count (CBC), routine blood chemistry analysis, tests for iron (serum iron, total iron-binding capacity), serum vitamin B₁₂ and folate levels, detection of rheumatoid factor (RF) and antinuclear antibody (ANA), and levels of complement (C₃, C₄). All values for the BMS subjects were compared with normal values characteristic of subjects of comparable age and sex.^{26,27)}

3. Saliva viscosity

Saliva viscosity were measured on 61

females of the 112 BMS patients (mean age of 50.2 ± 8.6 years and range of 32 to 68 years). The collections of stimulated whole saliva were done in all subjects by chewing paraffin wax with a constant rate about 60-70 chews/minutes. Viscosity measurements were performed at 37.0 ± 0.2 °C by means of a model LVT Wells-Brookfield cone-and-plate digital viscometer (Brookfield Engineering Laboratories, Stoughton, MA, U.S.A.). A 0.8-degree cone (model No.CP-40) was used. A 0.5-1.0 ml volume of fluid was used in each test and viscosity values were recorded in centipoise (cps) at shear rate 450.0 sec^{-1} . The data were compared with those of normal healthy subjects of comparable age and sex.²⁸⁾

4. Psychological evaluation

The evaluation of the psychological and emotional status of 54 BMS patients (47 women with a mean age of 46.3 ± 7.2 years and range of 31 to 65 years; 7 men with a mean age of 48.0 ± 11.1 years and range of 34

Table 2. Nine symptom dimensions and three global indices of SCL-90-R by Derogatis et al.

Somatization	(SOM)
Obsessive-Compulsive	(O-C)
Interpersnal Sensitivity	(I-S)
Depression	(DEP)
Anxiety	(ANX)
Hostility	(HOS)
Phobic anxiety	(PHOB)
Paranoid ideation	(PAR)
Psychoticism	(PSY)
Global Severity Index	(GSI)
Positive Symptom Distress Index	(PSDI)
Positive Symptom Total	(PST)

to 61 years) was done. They were applied one of the self-report modes of psychological measurement, Symptom Checklist-90-Revision (SCL-90-R) which was developed by Derogatis et al.²⁹⁾ in 1976 and standardized by Kim et al.³⁰⁾ in 1984 so it could be used in Korea and computerized. According to the standardized normative data, T-scores of nine symptom dimensions and three global indices were inputted to the computer (Table 2). The results were compared with normative data obtained in Korean population³⁰⁾ and the data obtained from the temporomandibular disorder patients by Lee et al.³¹⁾

5. Statistical analysis

The data were inputted on a IBM PC and all the statistical analyses were performed by SAS (SAS Institute Inc., U.S.A.). Chi-square test, t-test, and ANOVA were used to compare the mean values and to examine the effects of variables.

III. RESULTS

1. Clinical features

Total 112 cases of BMS patients were investigated, 93 (83%) were women of whom 10.8% were menopausal and 65.6% postmenopausal. The majority of the affected were older than 50 years, and females (male/female ratio 20.4%). The mean duration of BMS was 2.2 ± 2.5 years and a range of 10 days to 10 years. In BMS patients, although the burning can involve any mucosal site, the tongue was by far the most commonly involved site, either alone or multiple. The next common sites were the alveolar ridge & gingiva, palate, and buccal mucosa (Table 3, Fig. 1).

Oral examination revealed no significant differences between BMS and control subjects in any clinical features (e.g., number of teeth, dentures, crowns, bridges, parafunctional habits). However, the BMS subjects had significantly more complaints of dry mouth, persistent taste, altered taste perception, and difficulty swallowing than control subjects (Table 4, Fig. 2).

Some significant differences were found in the prevalence of certain diagnosed medical conditions in BMS patients: gastritis, anemia, indigestion, insomnia, and stressful conditions.

But no differences were found between the BMS and the control group in the other medical conditions sometimes link to BMS such as diabetes, hypertension and rheumatism^{1,12,32)} (Table 5, Fig. 3).

There was a higher occurrence of other health complaints in BMS subjects. The number of persons with hospitalization (BMS 46%, control 10%, $p < 0.01$) or medication (BMS 63%, control 25%, $p < 0.01$) for the pain complaints other than BMS was significantly higher in the BMS subjects than for the control subjects.

The pain history of BMS was also investigated. Although the onset of BMS was related to a previous dental procedure in 20%

Table 3. Sites of burning in 112 patients

Site	No. of patients (%) (n=112)
Tongue	72 (64)
Alveolar ridge & gingiva	19 (17)
Palate	17 (15)
Buccal mucosa	15 (13)
Floor of mouth	9 (8)
Oropharynx	6 (5)
Lip	5 (4)

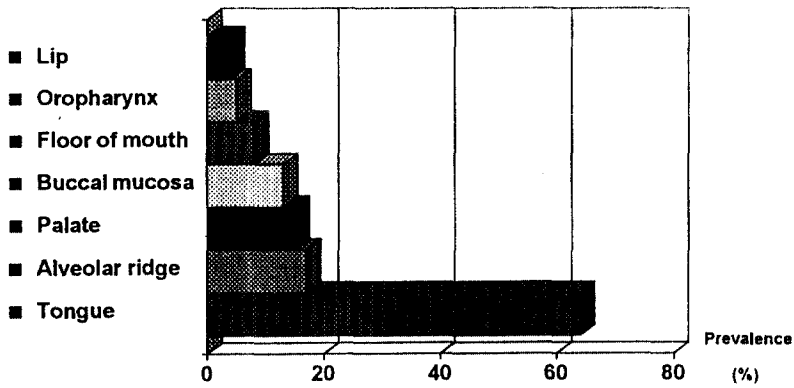


Fig. 1 . Distribution of sites affected by BMS

Table 4. Comparison of the prevalence of symptoms associated with BMS in BMS and control subjects

	No. of patients (%)		Significance
	BMS (n=112)	Control (n=92)	
Burning mouth	112 (100)	0(0)	
Dry mouth	69 (62)	12(13)	**
Persistent taste	60 (54)	5(5)	**
Altered taste perception	48 (43)	7(8)	**
Difficulty swallowing	33 (29)	5(5)	**
Dry eyes	10 (9)	4(4)	N.S.
Other throat problems	9 (8)	4(4)	N.S.

** : statistically significant (p < 0.01)

N.S.: not significant

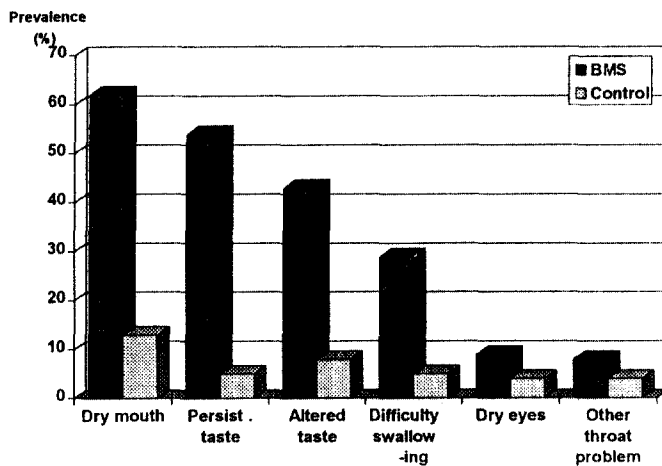


Fig. 2. Graph comparison of the prevalence of symptom associated with BMS in BMS and control subjects

Table 5. Variables of medical conditions with statistically significant differences between BMS and control groups

Medical conditions	Number of patients (%)		Significance
	BMS (n=112)	Control (n=92)	
Headache	70 (63)	40 (43)	**
Stress	34 (30)	11 (12)	**
Gastritis	30 (27)	6 (7)	**
Indigestion	29 (26)	13 (14)	*
Neck & shoulder pain	29 (26)	27 (28)	N.S.
Insomnia	23 (21)	6 (7)	**
Constipation	22 (20)	13 (14)	N.S.
Anemia	20 (18)	6 (7)	*
Allergy	17 (15)	6 (7)	N.S.
Hypertension	12 (11)	9 (10)	N.S.
Diabetes	11 (10)	5 (5)	N.S.
Rheumatism	10 (9)	5 (5)	N.S.
Colitis	5 (4)	1 (1)	N.S.
Vomiting	5 (4)	1 (1)	N.S.

** : statistically significant (p < 0.01)

* : statistically significant (p < 0.05)

N.S.: not significant

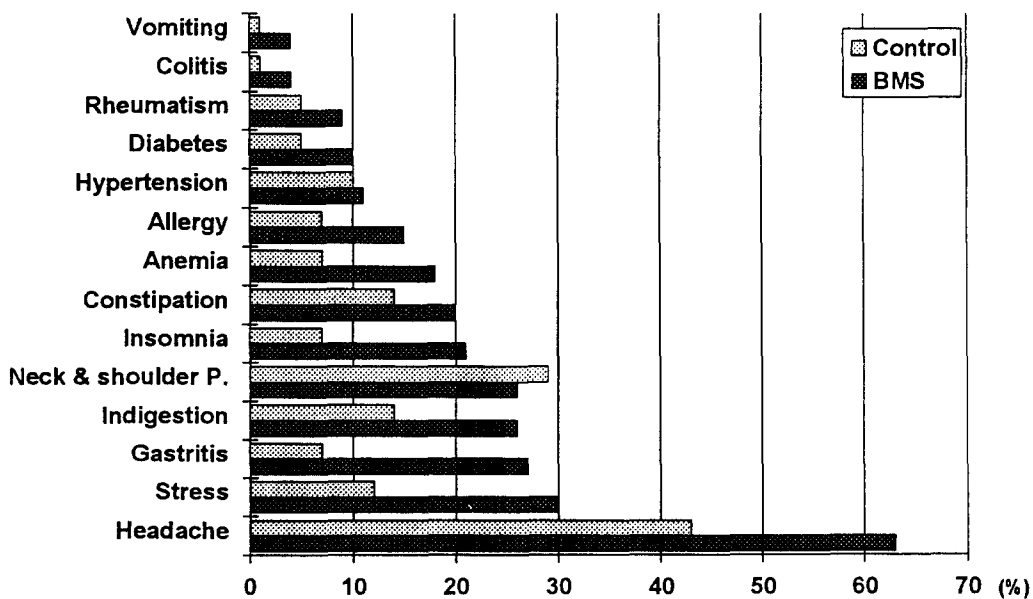


Fig. 3. Graph comparison of the prevalence of medical conditions in BMS and control subjects

of the subjects and to a previous illness in 7%, 32% of the subjects answered to a after the life changes or the stressful events and also 31% of the subjects could not relate it to any prior event. The daily routine of 79% of the subjects were interrupted because of BMS and 23% were complaining of difficulty in falling asleep at night and 61% of patients worried about the symptom become worse. Symptoms were persistent for 73% of the patients but intermittent for remaining 27%. The daily pain patterns were burning usually become severe at waking (13% of BMS subjects), midmorning(2%), early afternoon (2%), and evening (29%). Many BMS subjects reported increased burning with tension or fatigue (38% of subjects), hot foods (36%), and speaking (23%) and decreased burning with cold foods (18%) and eating meals (13%).

2. Hematologic examination

Complete blood count (CBC) were examined in 58 of the 112 BMS patients, and blood chemistry analyses were done in 54 patients. Tests for iron [serum iron, total iron-binding capacity (TIBC)], vitamin B₁₂ and folate levels were also underwent for 34 BMS patients. All the means of hematologic values were within normal ranges.

However, some patients showed an ab

normal hematologic values. Leukocyte levels in 11 patients (19%), RBC levels in 11 patients (19%), hemoglobin values in 7 patients (12%), hematocrit levels in 7 patients (12%), and platelets in one (2%) patient of 54 BMS subjects showed decreased values (Table 6).

Decreased serum iron, folate and vitamin B₁₂ levels also existed in some BMS patients. Four of 34 patients (12%) reported decreased serum iron levels, but no abnormal TIBC values were reported. Nine subjects (26%) had decreased serum folate levels and two subjects (6%) had decreased vitamin B₁₂ levels. (Table 7).

In other blood chemistry analyses for 54 BMS patients, decreased calcium levels in 8 patients (15%), increased glucose levels in 6 patients(11%) were reported. Table 8 shows a data of eight variables in blood chemistry analysis and the number of patients reported abnormal values.

The immunologic examinations for rheumatoid factor (RF), antinuclear antibody (ANA), levels of complement C₃, C₄ were done in only a few of the 23 BMS subjects. Three of these subjects had a positive RF, two had a positive ANA. Among them, one showed a positive RF and ANA. Only two subjects had an increased level of complement C₃. Total five of 23 BMS subjects (22%) had one or more abnormal results for the immunologic factors tested.

Table 6. Means, standard deviations of values of complete blood count in 58 BMS patients and number of patients with decreased values

Variables	Mean	S.D.	No. of patients (%)
WBC (10 ³ /μl)	5.36	1.37	11 (19)
RBC (10 ⁶ /μl)	4.33	0.33	11 (19)
Hemoglobin (g/dl)	13.30	1.55	7 (12)
Hematocrit (%)	39.99	4.44	7 (12)
Platelet (10 ³ /μl)	237.52	50.00	1 (2)

Table 7. Means, standard deviations of hematologic values of test for iron, folate, and vitamin B₁₂ in 34 BMS patients and number of patients with decreased values

Variables	Mean	S.D.	No. of patients (%)
Iron (µg/dl)	100.55	40.21	4 (12)
TIBC (µg/dl)	343.00	57.28	0 (0)
Folate (ng/ml)	5.49	3.77	9 (26)
Vitamin B ₁₂ (pg/ml)	454.64	172.63	2 (6)

Table 8. Means, standard deviations of hematologic values of blood chemistry in 54 BMS patients and number of patients with abnormal values

Variables	Mean	S.D.	No. of patients(%)	
			decreased	increased
Calcium (mg/dl)	9.08	0.34	8 (15)	0 (0)
Phosphorus (mg/dl)	3.63	0.49	0 (0)	1 (2)
Glucose (mg/dl)	102.41	22.94	0 (0)	6 (11)
Cholesterol (mg/dl)	192.98	40.44	0 (0)	6 (11)
T. Protein (g/dl)	7.43	0.41	0 (0)	2 (4)
T. Bilirubin (mg/dl)	0.77	0.32	0 (0)	4 (7)
SGOT (U/L)	24.34	10.47	0 (0)	3 (6)
SGPT (U/L)	23.94	20.72	0 (0)	6 (11)

Table 9. The viscosity values (cps) of stimulated whole saliva at share rate 450 sec⁻¹ in 61 BMS female patients and comparison with the age matched female controls.

Age	BMS (n=61)		Control (n=60)		Signifi- cance
	Mean	S.D.	Mean	S.D.	
30-39	0.88	0.22	0.77	0.23	N.S.
40-49	1.06	0.29	0.70	0.27	**
50-	1.02	0.43	0.71	0.43	**

** : statistically significant (p < 0.01)

N.S.: not significant

3. Saliva viscosity

The viscosity values of stimulated whole

saliva of BMS subjects divided by age groups at share rate of 450.0 sec⁻¹ were shown in Table 9. There were no statistically significant differences between age groups. In comparison with the age and sex matched normative data by Kho et al.²⁸⁾, the viscosity values of BMS subjects were significantly higher in the group of 40-49 years and of over 50 years of age than control subjects (p<0.01) (Fig. 4).

4. Emotional characteristics

Mean values of T-scores of nine symptom dimensions, three global indices and distribution of T-scores of 54 BMS patients were outputted. The mean values of T-scores of each symptom dimension and global index for patients as a whole were within normal

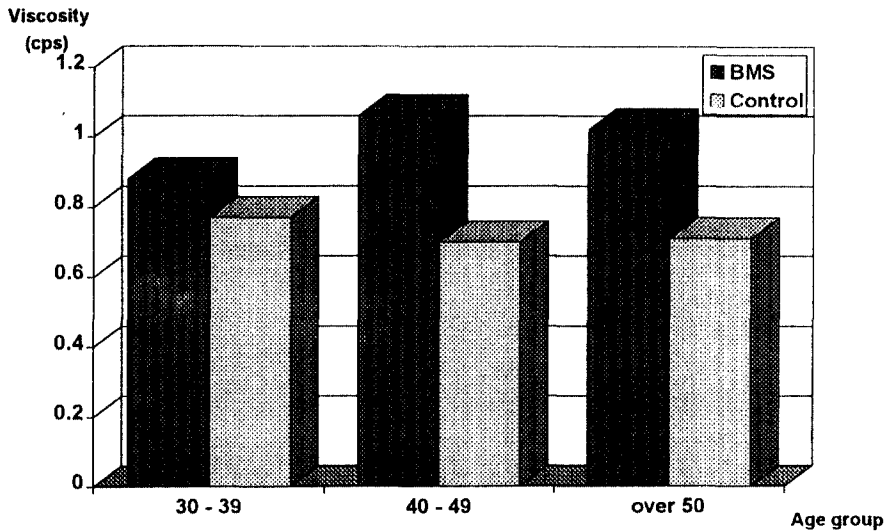


Fig. 4. Graph comparison of the viscosity values of stimulated whole saliva in BMS and control subjects

range, and the two higher mean values in nine symptom dimensions were those of SOM and DEP dimension (Fig. 5).

In comparison with the data obtained from the TMD patients over 30 years of age by Lee et al in 1989³¹⁾, the group of BMS patients

showed higher mean values of T-scores in the SOM, DEP, PSY dimensions and all global indices than the group of TMD patients. But there were no significant differences between the groups (Table 10).

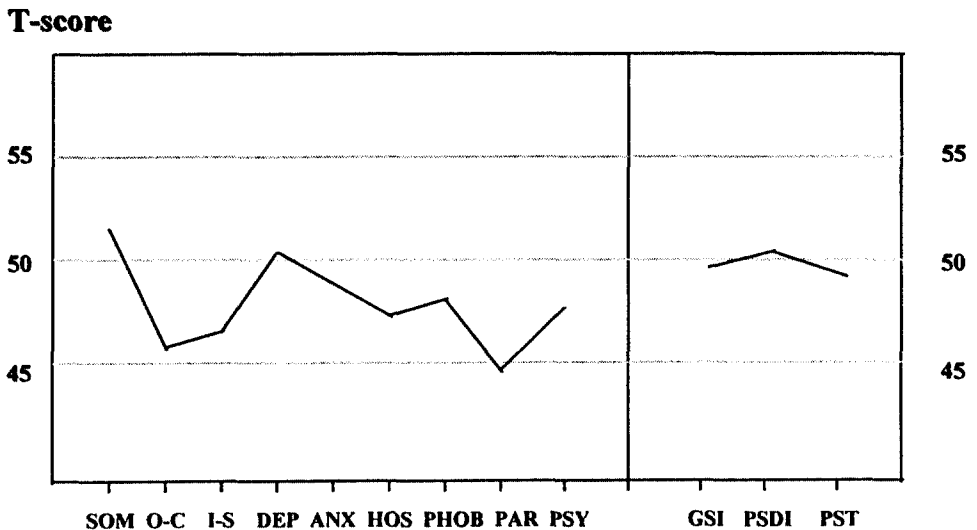


Fig. 5. Mean profiles of SCL-90-R T-scores of BMS patients

Table 10. Means and standard deviations of T-scores of SCL-90-R of 54 BMS patients and comparison with those of TMD patients over 30 years of age by Lee et al.³¹⁾

	BMS (n=54)		TMD (n=82)		p-value #
	Mean	S.D.	Mean	S.D.	
SOM	51.6	8.46	49.5	9.09	0.166
O-C	46.0	8.36	47.9	9.34	0.214
I-S	46.8	6.73	48.2	8.37	0.277
DEP	50.4	10.08	48.4	9.24	0.277
ANX	48.5	9.49	50.1	10.47	0.347
HOS	47.2	7.98	48.7	8.89	0.297
PHOB	47.8	10.56	47.8	9.58	0.990
PAR	44.7	7.97	46.6	8.36	0.194
PSY	47.7	7.37	47.4	7.87	0.852
GSI	49.9	12.35	48.0	9.15	0.337
PSDI	50.5	8.99	48.0	8.90	0.108
PST	49.3	10.02	48.1	10.08	0.491

#: There were no significant differences between groups

IV. DISCUSSION

Burning Mouth Syndrome is an enigmatic condition for both the patient and the clinician. Usually no signs of disease are visible and generally the presence of mucosal lesions precludes a diagnosis of BMS.⁷⁾ When the syndrome is not recognized as such, the patient may become exposed to a variety of treatment modalities, including dental and surgical procedures, which are not beneficial and often even aggravate the problem. The multiple etiologies proposed in the literature for BMS make definitive clinical diagnosis and treatment difficult. A review of the more commonly proposed etiologies may provide a framework from which clinicians can approach diagnosis and treatment of a patient suffering from BMS, even in the absence of clinical signs.

In accordance with other studies, the BMS subjects in this study were composed of

primarily premenopausal and postmenopausal women who experienced their pain in the distal structures of the mouth.^{2,4,14,33)} The male BMS subjects were found to be younger in age than the female BMS subjects. It is noteworthy that the triad of oral symptoms (burning mouth, dry mouth, and altered taste) described for patients with BMS has also been reported in approximately 20%^{10,12)} to 90%³⁴⁾ of premenopausal and postmenopausal women. Ferguson reported the oral symptoms comprising BMS can be the result of decreased estrogen levels.¹⁰⁾ However, other studies have not demonstrated a dramatic improvement in oral symptoms with estrogen replacement therapy.^{12,21)} It appears, therefore, that the pathogenesis of BMS may be linked in some as yet unclear manner to the physiologic changes that occur at menopause and postmenopause.

Since the purpose of this study was to characterize the features of BMS, total 112

BMS subjects were compared with 92 age- and sex-matched control subjects. In comparison with the control subjects, the BMS subjects reported a significantly higher prevalence of dry mouth, persistent taste, altered taste perception, and difficulty swallowing but had no differences in other oral or dental features. Dry mouth occurring with age has been suggested as a causative agent in the pathogenesis of BMS.³⁵⁾ However, the dry mouth complaint of the BMS subjects cannot be due to age alone since the prevalence of these complaint was significant lower in the control population, which was matched according to age and sex. Although xerostomia is frequently associated with BMS, Basker and Main emphasized the importance of differentiating between "real" and "perceived" dryness because the latter is most likely to have a psychogenic basis.³⁶⁾

The persistent taste and altered taste perception reported many of BMS subjects in present study are consistent with Grushka's psychophysical findings of statistically significant changes in taste perception in BMS subjects¹⁵⁾ and with electrogusmetric observations of taste alterations in persons with oral symptoms including burning mouth by Nilner & Nilsson.³⁷⁾ The basis of these changes is still unclear. One possibility is that increases in the spontaneous firing rate of certain of the afferent taste fibers (e.g., bitter) or afferent inhibition of others may be responsible.^{38,39)} The other is alterations in salivary composition may occur galvanic current result in metallic taste.⁴⁰⁾

Most patients with BMS describe the burning sensation at more than one site in the mouth. In the present study, the tongue was the most common site which confirmed earlier studies.^{2,4)} The next common sites were alveolar ridge & gingiva, palate, and buccal

mucosa. In Van der Ploeg et al.'s study, the lip was mentioned as the next common site⁴¹⁾, while in the patients reported by Grushka, the palate was reported as the next common site.²⁾

In almost BMS patients, the symptoms of BMS were continuously present over a period of months or years, without distinct periods of remission. Some of the factors that occurred significantly more often in the BMS subjects than in the control subjects (e.g., sleep disturbances, frequent headaches, stressful status) have been previously reported to occur in association with other chronic pain conditions^{42,43)} and may not be specific to BMS.

In the present study, a statistically significant differences were also reported between BMS and control subjects in anemia, gastritis, and indigestion. These findings confirmed the study of Maresky et al.²⁴⁾ Hematonic as well as other dietary deficiencies have long been associated with BMS. Because the metabolism and integrity of the oral mucosal lining is very sensitive to these deficiencies, atrophy and functional disturbances of peripheral nerve tissue can occur that may manifest as BMS. Hematologic screening of all patients with BMS should therefore be considered to identify any deficiencies, anemias, and malabsorption factors that may predispose to the condition.

In the hematologic study, all the means of hematologic values were within normal ranges. However, decreased RBC counts and hemato-crits were reported in 19% and 12% of BMS subjects, respectively. These confirmed the previously mentioned result of the question about medical conditions related to BMS (anemia was reported 18% of 112 BMS subjects). But, almost all hematologic values outside the range cited for the general population differed only marginally from normal values.

Iron deficiency, folate, and vitamin B₁₂ deficiencies have been frequently reported as a possible cause of oral discomfort.^{12,20)} In this study, decreased serum iron levels were presented in 12 % of the patients and decreased folate levels in 26% of the patients. But, only 2% of the patients showed decreased vitamin B₁₂ levels. The prevalence of folate deficiency in BMS varies between nonexistence in Lamey and Lamb's study⁵⁾ to 28.5% in the sample of Basker et al.¹²⁾ Folate like vitamin B₁₂ is involved with RNA and DNA metabolism. A deficiency of folate may lead to a burning mouth and also to an angular stomatitis. Iron deficiency has been described to be etiologically important in 5%⁵⁾ to 53%⁴⁴⁾ of the population with BMS. Possible causes are partial gastrectomy, pregnancy, and gastrointestinal blood loss by intestinal malignancy or other diseases.¹⁹⁾

The saliva is one of the important factors affecting oral symptoms. However, the evidence of decreased salivary flow rate in BMS patients is still controversial. Lamey & Lamb reported that xerostomia and oral dryness cause burning mouth.⁵⁾ In contrast, other studies found no differences in secretion rate between BMS patients and controls.⁴⁰⁾ Glick et al. reported potassium, phosphate, and total protein concentrations in unstimulated whole saliva of postmenopausal women with BMS were found to be higher than in controls.⁴⁵⁾ Grushka believed the composition of saliva to be more important in the causation of BMS than secretion rate.⁴⁾ Since subjective xerostomia has been linked to changes in salivary composition in persons with certain disorders, but not necessarily to decreased flow, it is possible that the subjective xerostomia prevalent among BMS subjects may be related to alterations in salivary composition.^{6,40,46)}

In the present study, the saliva samples of BMS subjects in the age group of 40-49 years and of over 50 years had viscosity values significant higher than those of control subjects with same age group. These differences could be explained by alterations in salivary composition, particularly the increase in total protein concentration.^{45,46)} Saliva is a complex system of glycoproteins, electrolytes, proteins, sugars, bacteria, enzymes, etc. Constituents such as proteins and polysaccharides in aqueous media form viscoelastic fluids, perhaps having internal structure. And, Shannon suggested that an increase in total protein was probably instrumental in producing the measured increase in viscosity.⁴⁷⁾ Such an increase in saliva viscosity occurs decreased efficacy of saliva as a lubricant. Thus, changes in the saliva viscosity from any causes could affect oral health by changing lubricating and protecting action and play a role in the causation of burning mouth symptoms and oral mucosal disorders.

The possible etiologic role of psychogenic causes of the burning sensation is widely discussed in the literature. Most of these literatures, however, are anecdotal, and only a few studies used objective psychometric methods to assess the patient's psychologic status. Lamb et al., using Cattell's 16 PF questionnaire, found psychological factors present in more than half the patients and in 70% of those unresponsive to treatment.²²⁾ Anxiety and depression were most frequently associated with BMS. Van der Ploeg et al., after extensive psychometric testing, found a higher than normal frequency of somatic reactions to stress and higher scores for neuroticism and neurosomatic lability.⁴¹⁾ Grushka et al. tested a BMS group and control sample of asymptomatic persons with the Minnesota Multiphasic Personality Inven-

tory.⁴⁸⁾ The BMS group was shown to be more concerned with bodily function and depressed, emotionally repressed, angry, distrustful, anxious, and socially isolated.

The SCL-90-R used in this study was designed to reflect the psychological symptom status of psychiatric and medical patients.²⁹⁾ It consists of 90 items, each representing one psychological symptom. The results that the mean values of T-scores of all symptom dimensions and global indices of all patients in this study were within normal range coincided with the reports of Van der Ploeg et al.⁴¹⁾ and Grushka.⁴⁸⁾ The code pattern of symptom dimensions of patients overall was 1-4 pattern, which means SOM dimension showed the highest values and DEP dimension the second highest. This indicates that BMS patients complain more about physical symptoms, including headache, pain, and functional disturbances of cardiovascular, gastrointestinal, respiratory, or other organs under the influence of autonomic nerve system, and the frequency of symptom associated with sadness, deficiency of motivation, loss of strength, and depressive state was increased. The 1-4 pattern of SCL-90-R implies that the incidence of psychogenic pain disorder, depressive disorder, somatization disorder, and antisocial personality disorder is increasing.⁴⁹⁾ In comparison with the TMD patients over 30 years of age³¹⁾, BMS patients showed higher mean values of T-scores in all global indices which represent a severity of psychological distress. Although the above associations were reported, it must be suggested that psychological distress can be the result rather than the cause and this opinion is corroborated by some studies investigating other chronic pain syndromes.⁵⁰⁾

The results of the present study are in general agreement with those published in the

literature. In clinical practice, however, none of the proposed etiologies can be ruled out a priori. As a consequence, a systematic approach is necessary to identify possible causes. Satisfactory management of these patients depends on meticulous initial investigation of all cases, the elimination or alleviation of any possible contributing factors, and regular monitoring and reevaluation including additional laboratory investigations when clinically indicated. All the cases of BMS must be fully prepared for the protracted period of management that may be necessary for the resolution of the complaint.

V. CONCLUSIONS

The author has investigated the clinical characteristics of 112 subjects suffering from BMS. Pain history, medical and dental questionnaires were administered to the patients and age- and sex- matched control subjects. Hematologic examinations and the viscosity measurement of stimulated whole saliva were done. For the study of psychological aspects, one of the self-reports modes of psychological measurement, Symptom Checklist-90-Revision (SCL-90-R) was performed to BMS subjects.

The obtained results were as follows:

1. Most BMS patients were pre- or postmenopausal women, and the frequently affected sites were the tongue, alveolar ridge & gingiva, palate, and buccal mucosa.
2. The BMS subjects reported a significantly higher prevalence of dry mouth, taste and sleep disturbances, anemia, gastrointestinal problems, headache, and nonspecific health complaints but no significant differences in other oral or dental features in comparison with those in the control subjects.

3. In the hematologic examinations, decreased serum folate levels and serum iron levels were found in 26% and 12% of the BMS subjects tested ,respectively.
4. The viscosity values of stimulated whole saliva of BMS subjects were greater than those of control subjects in the age of forties, and over fifties (p<0.01).
5. Mean values of SCL-90-R T-scores of each symptom dimension and global index of the overall patients were within normal range. The two higher mean values of T-scores among 9 symptom dimensions were those of SOM and DEP.

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구강내 작열감 증후군의 임상적 특징에 관한 연구

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구강내 작열감 증후군은 객관적 징후없이 구강점막에 작열감을 나타내는 만성동통장애이다. 다양한 원인요소들이 제시되어 있지만, 이러한 요소들의 관련성에 대해서는 아직 분명하지 않은 실정이다. 그러므로, 이러한 구강내 기능이상 of 근본적이고 효과적인 치료를 위해서는 다양한 임상적 관찰과 원인요소의 분석등이 계속 연구 조사되어야 할 것이다.

저자는 구강내 작열감 증후군의 증상을 호소하는 112명의 환자의 임상적 특징에 대해 조사하고자, 환자군과 대조군에 대해 구강내 작열감 증후군에 관한 설문조사 및 구강검사와 혈액학적 검사를 시행하였으며, 점도계를 사용하여 구강내 작열감 증후군 환자의 자극시 전타액의 점도를 측정하였다. 또한, 환자의 심리적 요인을 파악하고자 간이정신진단검사를 실시한 결과 다음과 같은 결론을 얻었다.

1. 구강내 작열감 증후군은 주로 폐경기 전후의 여성에서 많이 나타났으며, 호발부위는 혀, 치주 및 치조점막, 구개, 협점막의 순이었다.
2. 구강내 작열감 증후군 환자에게서 대조군 비해 구강건조감, 미각 및 수면장애, 빈혈, 소화기 장애, 두통과 기타 다른 신체불편감의 호소 등이 더 많이 나타났다.
3. 혈액학적 검사결과, 구강내 작열감 증후군 환자중의 26% 와 12%에서 각각 혈중 엽산농도와 철분농도의 저하를 나타냈다.
4. 자극시 분비된 전타액의 점도는 40대와 50대이상의 연령군에서 구강내 작열감 증후군 환자가 정상인에 비해 높았다 ($p < 0.01$).
5. 구강내 작열감 증후군 환자군의 간이정신진단검사의 각 증상차원 및 전체지표의 T점수의 평균치는 정상범위내에 있었으며, 신체화(SOM)와 우울(DEP)차원의 평균치가 가장 높았다.