

# Burning Mouth Syndrome and Prosthetic Dentistry: Etiology

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**Abstract:** *Burning mouth syndrome (BMS), or stomatodynia, is characterized by a burning sensation in the tongue or other parts of the oral cavity, usually in the absence of clinical or laboratory findings. The complaints are reported more often in women, especially after menopause. The etiological factors can be divided into: (1) systemic, (2) local, (3) psychogenic and psychiatric, and (4) idiopathic.*

**Keywords:** burning mouth syndrome, BMS, stomatodynia, stomatopyrosis, glossopyrosis, glossodynia, glossalgia, sore mouth, sore tongue, oraldysesthesia

## 1. Introduction

Burning mouth syndrome (BMS) is characterized by a burning sensation in the tongue or other parts of the oral cavity, usually in the absence of clinical or laboratory findings. Numerous causes have been suggested, including systemic, local, psychogenic and psychiatric, and idiopathic factors. The condition is probably of multifactorial origin, and its etiopathogenesis remains largely obscure.

### Etiology

Many conditions are associated with burning mouth syndrome (Table 1). Not surprisingly, oral pain, like any pain, can be polyetiological. The four main categories of factors are (1) systemic, (2) local, (3) psychiatric and psychological, and (4) idiopathic. It is most commonly

associated with psychiatric or psychological disorders, xerostomia, nutritional deficiency, allergic contact stomatitis, prosthetic treatment, parafunction, candidiasis, diabetes, menopause, hormonal imbalance, etc.(Chapanov, 2020) (Chapanov, 2020) (Kazakov, 2019)(Dimitrova, 2019) (Kazakova, 2019) (Kazakova, 2019)(Kazakova, 2019) (Kazakova, 2019)

It is important from a diagnostic point of view to distinguish between the so-called ‘glossodynia’ and ‘glossalgia’ (special cases of BMS). Glossodynia is caused by systemic factors and manifests as constant and severe pain covering the entire tongue, which patients often describe as pain ‘inside the tongue’. Glossalgia is due to local factors. Its clinical manifestation is like paroxysmal pain that affects only parts of the tongue.(Kazakov, 2018)(Vasilev, 2012)

**Table 1:** Etiological factors

Systemic	Local	Psychogenic and psychiatric	Idiopathic
Insufficiency of: <ul style="list-style-type: none"> <li>• Iron</li> <li>• Vitamin B<sub>12</sub></li> <li>• Folic acid</li> <li>• Zinc</li> <li>• Vitamin B complex</li> </ul>	Prosthetic reconstruction	Psychiatric: <ul style="list-style-type: none"> <li>• Depression</li> <li>• Anxiety</li> <li>• Obsessive Compulsive Disorder (OCD)</li> <li>• Dental disorder</li> <li>• Carcinophobia</li> </ul>	Unknown etiology
Endocrine: <ul style="list-style-type: none"> <li>• Diabetes</li> <li>• Hypothyroidism</li> <li>• Menopause</li> <li>• Hormonal imbalance</li> <li>• Gastrointestinal problems</li> </ul>	Dental work		Unknown etiology
Psychosocial stressors: <ul style="list-style-type: none"> <li>• Lifestyle</li> <li>• Chronic fatigue</li> </ul>	Mechanical factors		Unknown etiology
Xerostomia: <ol style="list-style-type: none"> <li>a) Connective tissue diseases</li> <li>b) Sjogren's syndrome</li> <li>c) Siccasynndrome (in menopausal women)</li> <li>d) Sarcoidosis</li> <li>e) Medicine intake <ul style="list-style-type: none"> <li>• Benzodiazepines</li> <li>• Sedatives</li> <li>• Tricyclic antidepressants</li> <li>• MAO inhibitors</li> <li>• Antihistamines</li> </ul> </li> </ol>	Parafunctions: <ul style="list-style-type: none"> <li>• Bruxism</li> <li>• Bruxomania</li> <li>• Improper tongue swallowing</li> <li>• Myofascialpain syndrome (MPS)</li> </ul>		Unknown etiology

<ul style="list-style-type: none"> <li>• Antihypertensive</li> </ul> f) Anxiety or stress			
Gastroesophageal reflux	Allergic contact stomatitis <ul style="list-style-type: none"> <li>• Prosthetic restorations or dental materials</li> <li>• Food</li> <li>• Preservatives, additives, colorants</li> </ul>		Unknown etiology
Anemia	Neurological <ul style="list-style-type: none"> <li>• Associated with the tonsils or teeth</li> <li>• Neuropathy of n. lingualis</li> <li>• Neuropathy of n. glossopharyngeus</li> <li>• Neurinoma on n. acousticus</li> </ul>		Unknown etiology
Central nervous system disorders: <ul style="list-style-type: none"> <li>• Hyperactivity of the sensory and motor branches of n. trigeminus</li> </ul>	Xerostomia <ul style="list-style-type: none"> <li>• Inflammation</li> <li>• Local disease</li> </ul>		Unknown etiology

### Multifactorial

In more than a third of patients, multiple, competing causes of BMS can be identified. They should be considered at the same time to achieve the best treatment result. (Bergdahl, 2007) (Grushka, 1987)

### Psychiatric and Psychological Disorders

Psychiatric illness is a common significant factor in patients with BMS. Psychiatric diseases have been reported in a different number of cases— 19-85%. At least one-third of patients have a psychiatric diagnosis, most commonly depressive disorders. 20% of them suffer from carcinophobia. They are worried that the symptoms may be due to oral or systemic cancer, although they rarely share their concerns with their doctor. Repeated self-observations are indicative of carcinophobia. (Patton, 2007)

Although BMS can be a somatic symptom of depression, it does not always have to be directly related. Depression and psychological disorders are common in people suffering from chronic pain and may be a consequence of chronic pain rather than a cause of BMS. In addition, many drugs used to treat psychiatric illnesses cause xerostomia and exacerbate BMS.

Mental disorders are indicative of some patients with SLE, but it is important not to immediately conclude that all patients with SLE have mental health problems. Unfortunately, these reasons are given when there is no obvious answer. Only a comprehensive examination would reveal a local or systemic cause of the symptoms. Direct questions should be asked about depression, anxiety, carcinophobia, or a family history of mental health problems and cancer. It is important in this case to work with a specialist psychiatrist.

### Xerostomia

Dry mouth is a common complaint in patients with BMS— 25% of cases with such complaints. Xerostomia itself can have many causes. Drug dryness is common in treatment with tricyclic antidepressants, benzodiazepines, MAO inhibitors, antihypertensives, antihistamines and others. Connective tissue diseases such as Sjögren's syndrome, sicca syndrome, sarcoidosis, as well as local inflammation or diabetes, can also cause xerostomia. Even stress and anxiety can cause dry mouth. Although not proven, there are hypothetical data on such causes as advancing age and menopause.

### Deficiency Conditions

Due to the rapid cell exchange and the presence of local trauma, the oral cavity is particularly sensitive to nutrient deficiencies and may be the first indicator of such a problem. Iron deficiency anemia, pernicious anemia (autoimmune deficiency of vitamin B<sub>12</sub>), zinc and vitamin B complex deficiency have been shown to cause BMS. Nutritional deficiencies are proven causes in 2-15% of patients. However, the mucosal changes (erythema, glossitis, papillary smoothing or atrophy) characteristic of them may be absent in patients with BMS. Replacement therapy is helpful in treating these deficient conditions.

### Allergic Contact Stomatitis

The role of allergens in BMS is somewhat controversial. Although some studies have shown widespread allergies to dental materials (acrylates, nickel, mercury, gold and cobalt), recent studies have not proven these materials or prosthetic structures to be a common cause of BMS. Allergic reactions to materials are relatively rare, so they must be proven with a patch test. Patients with BMS type 3 (intermittent pain) most often have positive tests. Essences and supplements are a proven allergen. 65% of type 3 have positive allergy tests, 80% of which improve when the allergen is avoided. Cinnamon aldehyde (cinnamon), sorbic acid (E<sub>200</sub>), tartrazine (E<sub>102</sub>), benzoic acid, propylene glycol, menthol and mint are potential causes of oral pain.

### Prosthetics Related Problems

Pain affecting the mucosa under the denture during wearing, and improvement after interruption of wearing, are indicative of BMS. The syndrome is rarely due to an allergy to the material used. The most common cause is improper denture performance, inflammation or parafunction. Candidiasis can also cause similar complaints. It has been proven that in 50% of patients the improper denture causes BMS, which symptoms disappear after the replacement with a new one. The main mistakes in denture making are: (1) reduced volume for the tongue, (2) lack of free space and (3) excessively long denture base. In the presence of these errors, the underlying tissues are subjected to greater stress or the normal function of the tongue is disturbed. Such problems are solved with the help of consultation with a prosthodontist who assesses the construction, occlusion, respectively the need for repair or replacement with a new denture. (Grushka, 2002)

### Parafunctions

BMS due to parafunctions is perhaps more common than previously thought, and is therefore often underestimated by dentists. Lamey and Lamb proved the presence of bad habits in 13% of people with BMS. (Lamey PJ, 1988) People who suffer from bruxism, bruxomania, improper swallowing, pressing the tongue on the teeth, protruding the tongue forward, trying to fit the denture with the tongue, may develop the syndrome. All of these actions are performed subconsciously or occur during stress. Examination of the surface of the teeth and denture may suggest the presence of parafunctions. A consultation with a specialist solves the problem.

### Candidiasis

Candidiasis leads to BMS in 6-30% of the cases, but mucosal changes typical of candidiasis may be minimal or absent. The pain subsides upon treatment with 3% amphotericin solution. Oral candidiasis is an opportunistic infection. *Candida albicans* is a normal inhabitant of the oral cavity in 40% of the patients, but candidiasis occurs in xerostomia, corticosteroid therapy, antibiotic treatment, wearing prostheses, diabetes and others. In these cases, empirical treatment of candidiasis is applied.

### Menopause or hormonal problems

Most patients with BMS are women. All studies conducted agree that the men to women ratio is 7:1. Other oral pain syndromes are also more common in women. As menopausal women predominate, the influence of hormones is discussed. (Volpe, 1991) However, in controlled clinical trials with systemic or local estrogen response, it had no greater effect than placebo treatment. There were no significant differences between women with BMS and a control group of pre-menopausal women, those treated with estrogen, and others several years after hormone therapy. Although there is an obvious link between BMS and this age group of women, no response to hormone therapy has been demonstrated. (López-Jornet, 2010)

### BMS associated with drug therapy

The ACE inhibitors enalapril, captopril and lisinopril can cause a burning mouth syndrome. Dose reduction or change of therapy has been shown to improve. (Lamey, 1996)

### Normal mucosal findings

Numerous studies have shown that geographic, fissured tongue, or the one with impressions, which are common as a result of bruxomania, are typical in people with BMS, even though they are considered asymptomatic. Although the syndrome does not necessarily develop in people with such findings, the link between them and pain has been proven. The presence of such changes in the tongue may increase the patient's carcinophobia. (Gurvits, 2013) (Scala, 2003) (Riley, 1998)

## 2. Conclusion

Burning mouth syndrome is a multifactorial disease that usually affects middle-aged and elderly women. Little objective data, however, supports the majority of these causes. Moreover, treatment of BMS based on one or more of the above-mentioned causes is usually unsatisfactory, thus

adequate control of the therapy and more research is needed in order to achieve better results.

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