

## REVIEW ARTICLE



## Burning Mouth Syndrome: A Review of the Etiopathologic Factors and Management

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### ABSTRACT

Burning mouth syndrome (BMS) is characterized by pain in the mouth with or with no inflammatory signs and no specific lesions. Synonyms found in literature include glossodynia, oral dysesthesia, glossopyrosis, glossalgia, stomatopyrosis, and stomatodynia. Burning mouth syndrome generally presents as a triad: Mouth pain, alteration in taste, and altered salivation, in the absence of visible mucosal lesions in the mouth. The syndrome generally manifests spontaneously, and the discomfort is typically of a continuous nature but increases in intensity during evening and at night. The etiopathogenesis seems to be complex and in a large number of patients probably involves interactions among local, systemic, and/or psychogenic factors. The differential diagnosis requires the exclusion of oral mucosal lesions or blood test alterations that can produce burning mouth sensation. Management is always based on the etiological agents involved. If burning persists after local or systemic conditions are treated, then treatment is aimed at controlling neuropathic symptoms. Treatment of BMS is still unsatisfactory, and there is no definitive cure. As a result, a multidisciplinary approach is required to bring the condition under better control. The aim of this review was to discuss several aspects of BMS, update current knowledge, and provide guidelines for patient management.

**Keywords:** Burning mouth syndrome, Glossodynia, Neuropathic pain, Orofacial pain, Salivary flow, Xerostomia.

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### INTRODUCTION

Burning mouth syndrome (BMS) is also known as glossodynia, glossalgia, glossopyrosis, stomatodynia, or oral dysphasia. It has been recognized worldwide and affects 2.6% of the general population.<sup>1,2</sup> Glossodynia is characterized by intraoral pain disorder with burning or altered sensation in the tongue, gingiva, lips, or denture-bearing areas. The burning may be unilateral or bilateral and tends to be relieved by eating or drinking. Other symptoms commonly associated with this disorder include dry mouth, headache, sleep disturbances, and severe postmenopausal symptoms in women.<sup>3,4</sup> Traditionally, it has been described as a chronic syndrome without specific organic etiology, and those diagnosed with BMS are often emotionally disturbed postmenopausal women. Women are particularly affected by the condition; they are diagnosed with symptoms seven times more frequently than males.<sup>5</sup>

Burning mouth syndrome can be divided into two types: Either with observable alterations of the tongue or without any observable alterations of the tongue. The common observable signs of BMS are inflamed fungiform papillae, a localized reddening due to trauma or atrophy of the filiform papillae, localized or generalized lobulations, and generalized redness.<sup>6</sup> These symptoms may alter an individual's sense of taste. In the second type of BMS with no observable alterations of the tongue, there is no evidence of tissue abnormalities and both the filiform and fungiform papillae of the tongue are without any atrophic changes. Although the burning sensations are readily recognizable symptoms, the underlying cause is always obscure. The clinician must consider various etiological factors with careful and thorough clinical examination plus laboratory investigations before diagnosing a case of glossodynia. The purpose of this article is to present a systemic approach to the differential diagnosis of glossodynia.

## ETIOLOGIC FACTORS OF GLOSSODYNIA

The etiologic factors of glossodynia include local, systemic, and psychogenic causes.<sup>7</sup> Several reports suggest that this condition is not due to psychological factors alone but may be a form of neuropathic pain that then results in psychological effects. Studies have noted that not only do patients have a sensation of burning in their mouths but also there are often changes in taste and salivation.<sup>8</sup>

The local factors include candidiasis, bacterial infections, allergies, temporomandibular joint symptoms, and dysfunctions of the salivary glands.<sup>9</sup> Burning mouth syndrome could also be caused by the metals used in the dental restorations and prostheses, as well by acrylate monomers, although no significant association could be observed between the patients and positive patch test reactions.<sup>10</sup> The systemic factors are most commonly divided into the following groups: Deficiencies of different types, hormonal and immunologic disturbances, and the side effects of drugs. The psychogenic factors describe different mental states which are believed to cause BMS.<sup>11</sup>

### Candidiasis

One of the most common causes of glossodynia is candidiasis caused by *Candida albicans*, a fungal organism that exists in the oral cavity as a part of normal flora. There is a competitive inhibition with other organisms in the oral flora. The host immune defenses maintain the *Candida* population in low numbers. When there is a disruption of the ecosystem or the host defense mechanism is lowered, the *Candida* proliferates and as a result candidiasis develops.<sup>12</sup> Candidiasis can also occur from the prolonged use of antibiotics, corticosteroids, and cancer chemotherapy. Those with debilitating diseases like diabetes mellitus often have candidiasis as well. Trauma from ill-fitting dentures along with poor oral hygiene allows *Candida* organisms to penetrate the oral tissues, thus resulting in candidiasis. The oral manifestations of candidiasis range from erythema to creamy whiter colonies that may be associated with angular cheilitis.<sup>13</sup> There is burning sensation of entire oral mucosa rather than only the tongue. The treatment consists of rinsing the mouth with nystatin oral suspension or clotrimazole troches.

### Lichen Planus

Lichen planus is a dermatological disease with oral manifestations. Recent studies indicate that oral lesions are present without skin lesions in 65% of lichen planus cases. Even though the exact etiology of lichen planus is unknown, it is presumed to be an autoimmune or psychosomatic disease.<sup>14</sup> The predisposing factors for

lichen planus are emotional stress, trauma, viral or bacterial infection, hypersensitivity, or drug therapy. The buccal mucosa is the most common site, but the tongue and gingival area may also be affected.<sup>15</sup> The symptoms of burning and pain occur most often with erosive lichen planus. The diagnosis is made by a histological examination and biopsy. Local or systemic corticosteroid therapy is frequently helpful in the acute phase of erosive lichen planus. The incidence of malignant transformation of erosive lichen planus varies from 0 to 10%. Therefore, careful monitoring is recommended, as chronic oral ulcerative lesions might represent a cofactor in the development of malignancy in certain people.

### Oral Cancer

Burning mouth syndrome may be caused by oral cancer, which is normally present on the lateral borders of the tongue or the oropharynx.<sup>16</sup> Dental surgeons because of its continual association with the oral cavity have the greatest opportunity to detect early oral cancer and can educate prevention among their patients. Patients with persistent leukoplakia and accompanying burning symptoms need to have a biopsy in order to test for oral cancer.<sup>17,18</sup>

### Migratory Glossitis

Migratory glossitis is an asymptomatic inflammatory condition that can be painful. A patient with migratory glossitis will often go to the dentist because of the unusual appearance of the tongue, rather than complaints of pain.<sup>19</sup> It is a common idiopathic recurring condition, which manifests as an area of depapillation of the filiform papillae of the tongue with white hypertrophic borders. The patient may complain of a burning sensation of the tongue in the depapillated area after eating hot or spicy foods. The treatment for migratory glossitis is symptomatic, according to each symptom. As there is no helpful therapy, most patients are relieved to know that the disease is not contagious, life-threatening, and not a sign of any serious internal problem. In patients who experience pain, analgesics are prescribed.<sup>19,20</sup>

### Xerostomia

Xerostomia, the subjective feeling of dry mouth, is a symptom most frequently associated with alterations in the quality and quantity of saliva resulting from poor health, certain drugs, and radiation therapy.<sup>21</sup> Patients with severe xerostomia will often complain of dry, burning mouth, which can be very painful and interfere with functions.<sup>22</sup> Xerostomia is normally caused by a local factor, radiation therapy. Ionizing radiation causes pronounced changes in salivary glands, and the

degeneration of acini.<sup>23-26</sup> Saliva substitute and fluoride gel should be used to reduce the risk of caries from radiation therapy.

### Diabetes

The oral manifestations of diabetes comprise painless swelling of the parotid, increased amounts of glucose in serous saliva, increased risk of periodontal disease, and caries. Glossodynia may be one of the symptoms of diabetes, which is often associated with xerostomia and candidiasis. There also may be diabetic neuropathies, which manifest in the head and neck region contributing to glossodynia.<sup>27</sup> The management of diabetic glossodynia is achieved by controlling diabetes.<sup>28</sup>

### Sjögren's Syndrome

Sjögren's syndrome is a chronic disease in which the body's white blood cells attack the moisture-producing glands causing various symptoms, one being dry mouth.<sup>29</sup> Glossodynia may appear early in the course of the disease, before other symptoms appear. The oral symptoms of Sjögren's syndrome are due to xerostomia. Although there is no effective treatment, saliva substitute and fluoride gel should be prescribed for the relief of these oral symptoms.<sup>30</sup>

### Medications

Drugs used to treat a variety of systemic disorders produce varying degrees of xerostomia, such as pharmacologically induced xerostomia and Iatrogenic xerostomia. Short-term xerostomia itself often does not cause oral discomfort and dental problems, rather the prolonged use of certain drugs that lead to xerostomia may produce oral discomfort with an increased incidence of caries.<sup>31</sup> There are many descriptions in literature of glossitis in patients taking angiotensin converting enzyme inhibitors.<sup>32</sup> Antiretroviral drugs, antibiotics, tricyclic antidepressants, and antianxiety drugs are also cited as causing burning mouth.

### Nutritional Deficiencies

Glossodynia may be one of the symptoms of deficiency states especially iron, vitamin B, and folic acid.<sup>33</sup> Iron deficiency can cause oral discomfort with glossodynia and angular cheilitis. The atrophic changes in the epithelium of any part of oral mucosa may result in non-specific ulceration. These atrophic changes in the oral pharyngeal mucosa may lead to widespread soreness and dysphasia.<sup>34,35</sup> The patient may experience angular cheilitis, thrush, and complain of taste disturbance due to atrophy of the tongue epithelium. A deficiency of

folic acid may lead to burning mouth angular cheilitis and glossodynia. The tongue shows varying degrees of papillary atrophy which progresses until the surface of tongue is smooth and shiny. The diagnosis is done by red blood corpuscle morphology and serum folate level. Likewise, niacin deficiency causes generalized erythema of the oral mucosa along with papillary atrophy.<sup>36</sup> Zinc deficiency may cause organic effects such as lingual papillary atrophy, resulting in dysgeusia and glossodynia. Zinc supplements showed improvement in symptoms and further clinical improvement when zinc was associated with B12 vitamin and iron.<sup>37</sup>

### Psychogenic Factors

Psychogenic factors are often implicated as being etiologic in BMS and are the most frequent factor in many patients. Glossodynia is one of the classic symptoms of anxiety and depression precipitated by psychological stress.<sup>38</sup> The diagnosis of psychologically induced glossodynia is established after all local and systemic factors are excluded by a negative clinical picture, negative laboratory findings, and positive historical data regarding emotional factors. Normally, the burning sensation is confined to the tongue, but in some cases the palate and lips are also involved. Glossodynia may be a symptom of cancer phobia. Reassuring the patients after a complete diagnosis is often helpful in relieving the symptoms.<sup>38,39</sup> The treatment of psychogenic glossodynia is anxiolytic/antidepressant drugs or by referring the patients for psychiatric consultation.

### Dental Causes

A faulty denture may promote the burning sensation due to an increased level of functional stress to the oral musculature. Some of the denture base materials and denture liners also cause burning sensation of the oral mucosa. Other allergens, which cause BMS, include propylene glycol, benzoates, and cinnamon aldehyde, and other ingredients in some dentifrices.

### Trauma

Low incidence of trauma may be on the list of causes for oral burning. Trauma may be in the form of physical, chemical, or thermal injury.<sup>40,41</sup> Occasionally, some patients are diagnosed with glossodynia from the presence of multiple etiologic factors. The exact amount of burning sensation from each cause is unknown, but it is evident that more than one can exist in such patients.<sup>42</sup>

### MANAGEMENT

Burning mouth syndrome is usually multifactorial, and these patients require an organized approach to take the

various etiologies into account. A detailed general and oral physical examination should be made to uncover the presence of erythema, glossitis, lingual papilla atrophy, sings of tongue biting, *Candida* infection, lingua plicata, geographic tongue, lichen planus, or xerostomia. When the causative factors contributing to the symptoms of a burning mouth are identified, these should be further investigated and corrected appropriately.<sup>43</sup> In the absence of local or systemic causes, the diagnosis of BMS is likely and the patient needs to be thoroughly reassured that there is no other cause. Patients with BMS often feel that they have insufficient information about the condition, and verbal information should be reinforced with well-designed written information. Management of this condition is hampered by a lack of good quality trials of treatment.<sup>44</sup>

Although a large variety of drugs, medications, and miscellaneous treatments have been proposed in BMS, the treatment management of this syndrome is still not satisfactory, and there is no definitive cure.<sup>45</sup> The medical management of BMS follows the example of other neuropathic pain conditions and includes low dosages of benzodiazepines, tricyclic antidepressants, and anticonvulsants. Supportive care is mandatory when the etiology cannot be traced. This will reduce the suffering of the patients, to bring their condition under better control and improve the quality of life.<sup>46</sup> Many pharmacological agents, administered topically or systemically, have been proposed to overcome the pain in BMS. Low doses of capsaicin, applied three or four times topically, appear to be quickly effective in alleviating the pain in BMS subjects (Tables 1 and 2).<sup>47-49</sup>

Cognitive behavior therapy has been shown to have some benefit in this condition, but is complex and clinically intensive. This involves the identification of maladaptive thought processing and it attempts to change this

**Table 1:** Etiological factors in the causation of burning mouth syndrome<sup>48</sup>

<i>Local factors</i>	<i>Systemic factors</i>
Candidiasis	Climacteric as postmenopausal hypoestrogenism
Migratory glossitis	Diabetes
Lichen planus	Sjögren's syndrome (xerostomia)
Trauma	Drug reactions (xerostomia)
Oral cancer	Deficiency states— <i>anemia</i> (iron, vitamin B, folic acid deficiencies)
Denture faults	Lingual artery atherosclerosis
Impression surface	Rheumatoid arthritis
Polished surface	Gastric disturbances such as hyperacidity
Occlusal surface	Xerostomia
Denture plaque	Hypothyroidism
Residual monomer	
Sensitivity to dental materials	
Radiation therapy (xerostomia)	
Periodontal diseases	
Electrogalvanic discharge	

in a positive way. Other treatment modalities that may be considered in BMS patients which have been used but so far do not have good quality evidence for efficacy include antidepressants, vitamins, or dietary supplements, such as alpha lipoic acid, analgesic sprays, or mouthwashes, such as benzydamine hydrochloride and, in postmenopausal female patients, hormone replacement or topical estrogen applied to the oral mucosa. If dry mouth or xerostomia is the prominent symptom, then saliva substitutes may be considered.

## CONCLUSION

Burning mouth syndrome is an idiopathic burning discomfort or pain affecting people with clinically normal

**Table 2:** Medical management of burning mouth syndrome

<i>Medications</i>	<i>Examples of specific agents</i>	<i>Common dosage range</i>	<i>Prescription</i>
Tricyclic antidepressants	Amitriptyline Nortriptyline	10–150 mg/day	10 mg at bedtime; increase dosage by 10 mg every 4–7 days until oral burning is relieved or side effects occur
Benzodiazepines	Clonazepam	0.25–2 mg/day	0.25 mg at bedtime; increase dosage by 0.25 mg every 4–7 days until oral burning is relieved or side effects occur; as dosage increases, medication is taken as full dose or in three divided doses
	Chlordiazepoxide	10–30 mg/day	5 mg at bedtime; increase dosage by 5 mg every 4–7 days until oral burning is relieved or side effects occur; as dosage increases, medication is taken in three divided doses
Anticonvulsants	Gabapentin	300–1600 mg/day	100 mg at bedtime; increase dosage by 100 mg every 4–7 days until oral burning is relieved or side effects occur; as dosage increases, medication is taken in three divided doses
Capsaicin	Hot pepper and water	Variable	Rinse mouth with 1 teaspoon of a 1:2 dilution (or higher) of hot pepper and water; increase strength of capsaicin as tolerated to a maximum of 1:1 dilution

Adapted and modified from Grushka et al<sup>49</sup>

oral mucosa in whom a medical or dental cause has been excluded. The clinical features of BMS include burning pain which can be localized just to the tongue and/or lips but can be more widespread and involve the whole of the oral cavity. The disorder has long been linked to a variety of other conditions: menopause, diabetes, nutritional deficiencies, disorders of the mouth, candidiasis, dry mouth, acid reflux, cancer therapy, and psychological problems. The pathophysiology of the disease is unknown; no single treatment has been proven universally successful. Symptomatic management of the condition with topical and systemic medications helps to alleviate the situation. Cognitive and behavioral therapies can be used as an adjunctive measure.

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