

Etiology, Diagnosis And Therapy Of Burning Mouth Syndrome In Denture Wearers - Review

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Abstract:

Background: The Burning Mouth Syndrome (BMS) is an oral mucosa pain - with or without inflammatory signs - without any specific lesion. Burning mouth syndrome (BMS) is multifactorial in origin which is typically characterized by burning and painful sensation in an oral cavity. The cause of BMS is not known, therefore a complex association of biological, psychological and neuropathic factors has been identified. BMS is classified as an idiopathic (nociceptive) orofacial pain with or without somatosensory changes by International Classification of Orofacial Pain (ICOP 2020). The aim of this study was to understand the etiological factors (local, systemic, and psychosocial) which may be responsible for oral burning associated with BMS, and to offer the prosthodontic practitioners possibilities for treatment generally at all patients, especially at denture wearers in solving this problem.

Materials and methods: Review of literature was used to analyze the etiological factors for BMS, pain characteristics, diagnostic criteria and treatment possibilities for BMS condition at patients with dentures.

Results: BMS can be divided into three types depending on the intensity of pain. There are also few possible theories behind the cause of BMS. Local oral factors are: denture acrylic allergies, poorly fitting dentures, para functional activities, salivary gland dysfunction, taste dysfunction, infectious agents, periodontal diseases, peripheral nerve damage. Systemic factors are: nutritional deficiency/anemia, central nervous system disorders, psychological disorders, hormonal changes and diabetes mellitus, xerostomia and Sjogren's syndrome.

Discussion: Problems with dentures are important factors in the burning symptoms. Inadequate denture retention and stability can induce abnormal tongue activity and become a habit to retain the denture extensions and in adequate freeway space increase load on the denture bearing areas which results of burning mouth sensation. It is clinically helpful if patients find that removal of the denture relieves their symptoms. Although the short-term follow-up studies may show potential symptomatic improvement with treatment in patients with BMS, the long-term outcomes for BMS remain unclear. In perspective, complete understanding of the etiology and pathogenesis is imperative to the development of novel and efficacious therapeutic strategies and will guide overall prognosis of the disease in the future.

Conclusion: Although different etiological theories have been proposed to explain primary burning mouth syndrome, none have received universal acceptance to date. BMS is a difficult and challenging problem for the dental practitioner. It is a clinical diagnosis made via the exclusion of all other causes. No universally accepted diagnostic criteria, laboratory tests, imaging studies or other modalities definitively diagnose or exclude BMS. The key to successful management is a good diagnostic work-up and coordination between the prosthodontic practitioners and appropriate physicians and psychologists. All this together will help prosthodontics practitioners to better diagnose and treat the BMS.

Key Word: Burning mouth syndrome, etiology, treatment, denture wearers

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I. Introduction

Definition of burning mouth syndrome (BMS) by the International Association for the Study of Pain¹ is: burning pain in the tongue or other oral mucous membrane associated with normal signs and laboratory findings lasting at least four to six months. The International Headache Society in The International Classification of Headache Disorders II⁴ describes BMS as an intra-oral burning sensation for which no medical or dental cause can be found. Burning mouth syndrome (BMS) is a chronic pain disorder characterized by burning, stinging, and/or itching of the oral cavity in the absence of any organic disease. The Burning Mouth Syndrome (BMS) is an oral mucosa pain - with or without inflammatory signs - without any specific lesion. Epidemiological studies on BMS have estimated a prevalence rate of 2.6–5.1%. The prevalence of BMS reported from international studies

ranges from commonly reported range has been 0.7–4.6%. The mean age of BMS is between 55 and 60 years, with occurrence under 30 being rare. The ratio between females and males varies from 3:1 to 16:1¹.

II. Material And Methods

Review of literature was used to analyze the etiological factors for BMS, pain characteristics, diagnostic criteria and treatment possibilities for BMS condition at patients with dentures.

III. Results

Authors classified BMS into three types depending on the intensity of pain²:

1. Type 1 (35%) is characterized by patients having burning every day. The burning is absent on waking but presents as the day goes on, being maximal in the evening. This type may be linked to systemic disorders, such as nutritional deficiencies and endocrine disorders
2. Type 2 (55%) is characterized by burning that occurs every day, is present on awakening and often makes falling asleep at night difficult. This subgroup of patients often reports mood changes, alterations in eating habits, and decreased desire to socialize, which seem to be attributable to an altered sleep pattern
3. Type 3 (10%) is characterized by intermittent burning, present only on some days, with burning affecting unusual sites such as the floor of the mouth, buccal mucosa, and throat. These patients frequently display anxiety and allergic reactions, particularly to food additives³.

The possible theories behind the cause of BMS are enlisted here:

1. Abnormal interaction between the sensory functions of facial and trigeminal nerves According to this theory, certain individuals labeled as supertasters (mainly females) due to the high density of fungiform papilla present on the anterior aspect of tongue, are at risk of developing burning pain⁴.
2. Sensory dysfunction associated with small and/or large fiber neuropathy. It is found that almost 90% of individuals with BMS had some form of altered sensory threshold and/or blink reflex reaction. Immunohistochemical and microscopic observations revealed axonal degeneration of epithelial and subpapillary nerve fibers in the affected epithelium of the oral mucosa⁵.
3. Centrally mediated alteration in the modulation of nociceptive processing. This theory explains the fact that resulting in reduced central pain suppression in BMS individuals⁶.
4. Disturbances in the autonomic innervation and oral blood flow⁷.
5. Chronic anxiety or stress results in the alteration of gonadal, adrenal, and neuroactive steroid levels in skin and oral mucosa⁷.

A number of hypotheses have been proposed to explain the etiopathogenic mechanism of BMS. The first studies attributed great importance to endocrine alterations and tissue degenerative phenomena inherent to aging. BMS is multitude of causes which may be placed in to three groups².

Local oral factors

Denture acrylic allergies - High residual monomer levels have been suggested as a causative factor. However it was found that it was not possible to correlate any signs that implicated dentures as a local etiologic agent.

Poorly fitting dentures - It is more likely that mechanical irritation due to errors in denture design and parafunctional habits that may cause denture related burning⁴.

Para functional activities - Para functional activities resulting in excessive occlusal and denture wear has been shown in 61% of patients with BMS parafunction (especially night bruxism) is probably the result of an interaction between the limbic system and the motor system, but the dopaminergic system might also be involved. Also parafunctional activity of lip sucking, lip licking, lip pressure and mouth breathing were noted with BMS.

Salivary gland dysfunction - Many patients with BMS complained of a dry mouth (xerostomia) which is decreased salivary gland secretion in patients with BMS². Irregularities in saliva metabolites like protein, potassium and phosphate concentration have been documented in patients with BMS, where there was significant increase in unstimulated salivary metabolites particularly potassium, phosphate and protein. Complaints of dry mouth may not necessarily be predictive of salivary gland hypo function. It may be due to multiple medical problems and medication rather than BMS⁸.

Taste dysfunction - Many BMS subjects have reported with persistent dysgeusia (usually bitter or metallic) and altered taste perception. The abnormalities in salt and sweet taste are consistent with anterior tongue involvement which is a common site for BMS. Also altered taste in BMS may be due to effects of salivary hypofunction and alterations in salivary composition. The basis of these is unclear however one possibility is that increased spontaneous firing rate of certain afferent taste fibers (e.g. bitter) or afferent inhibitions of others⁹.

Infectious agents - Candidiasis has been the most frequently identified infectious agent. Prevalence of Candida has been found in patients with BMS than those without symptoms. Fusospirochetal infection and mucosal diseases such as geographic tongue or benign migratory mucositis have been found in patients with BMS.

Periodontal diseases - Although a periodontal disease as etiological factor has been suggested for BMS. There is no scientific evidence of a direct causal relationship of periodontal disease to BMS.

Peripheral nerve damage - BMS may be associated with neuropathic conditions possibly involving central or peripheral nervous system or both. This can occur in inflammatory conditions or nerve injuries (neuroma) if there is a history of trauma to the region where burning is experienced. In a study conducted by Connecticut Chemotherapy Clinical Research Centre (CCCRC), to evaluate the effect of topical anesthetic (dyclonine HCl) on patients' intensity ratings for oral burning and taste dysgeusia. The subjects were divided into 3 groups as burning-only, dysgeusia-only and lastly both burning and dysgeusia group. Burning sensations increased after application of topical anesthesia in the burning-only group and in the burning and the dysgeusia group, but dysgeusia symptoms never increased in the dysgeusia-only group and in the burning and the dysgeusia group. Alternatively dysgeusia symptoms were more likely to decrease or become abolished, compared with burning sensation. These findings imply that in dysgeusia excitatory afferent input could evoke burning sensation suggestive of peripheral abnormalities; alternatively topical anesthesia may be releasing peripheral inhibition of central sensory pathways in some patients who have oral burning, since approximately one third of subjects with burning sensations experienced increased sensation. This could suggest a centrally based neuropathic condition and provide a rationale for the use of centrally acting medication.

Systemic factors

Nutritional deficiency/anemia - Nutritional deficiency including iron, B1, B2, B6, B12 and zinc have been associated with BMS. Folic acid deficiency is also a causative factor for BMS. However recent studies have little support for nutritional deficiencies as a causative factor. One explanation for the discrepancy in results of iron deficiency causing BMS is that earlier studies did not always measure serum ferritin levels, as normal level of serum ferritin precludes a diagnosis of iron deficiency even in the presence of decreased serum iron. Replacement therapy of vitamin B1, B2 and B6 produced resolution of symptoms in only 30 percent of patients with such deficiency. Most recently, zinc deficiency was shown to be a possible cause of BMS, with patients reporting improved symptoms after zinc replacement therapy. A potential relationship between smoking and development of BMS has been described, with an estimated odd ratio of 12.6 in a recent study ¹⁰.

Central nervous system disorders - In the trigeminal and spinal somatosensory systems interactions between various sensory inputs occur such that transmission via one pathway (related to pain) can be modulated by other sensory pathways (related to touch) this alteration in one of these pathways might unmask or enhance nociceptive afferent inputs leading to pain such as that of BMS ¹⁰.

Psychological disorders - A complex spectrum of social and psychological disturbance was found in patients with BMS. Patients with BMS tended to be more depressed, angry, doubting, apprehensive, and introverted as a direct result of pain experience. Pain of BMS has been attributed to the manifestation of exogenous or reactive depression caused by the external stress of desolation or anxiety. Psychologic factors in BMS have been reported by several authors. BMS may be regarded as a variant of atypical facial pain in which an association with depression is found when psychiatric disorder is present it usually takes the form of mixed anxiety and depressive symptoms. A study confirmed that two aspects of neurosis seen in hospital practice anxiety and depression are involved in BMS and there is response to antidepressant medication.

Hormonal changes and Diabetes mellitus - Studies shown an incidence of oral burning in only 2 to 10 percent of diabetics which indicates that diabetes may not be main cause for BMS ¹¹. However it may predispose to candidiasis, responsible for burning. Hormonal changes are still considered to be important factors in BMS. The greatest frequency of onset of burning mouth syndrome among post menopausal women was reported from 3 years before to 12 years after menopause.

Xerostomia - Xerostomia occurring with age has been suggested as a causative agent in the pathogenesis of BMS. However the evidence of decreased salivary flow with age is still controversial ¹².

Sjogren's syndrome - BMS had evidence of an immunologic abnormality which may be linked to a more generalized connective tissue disorder like Sjogren's syndrome ¹³.

The patients usually complain of chronic pain of 4–6 months duration, burning or scalding type, sometimes itching sensation or numbness of the tongue, and other oral mucosal surfaces. Typically, pain is localized to the tongue and sometimes involving other mucosal surfaces also such as palate, lip, buccal mucosa, and floor of the mouth ¹⁴. The pain is primarily bilateral and symmetrical on the anterior two-third of the tongue (71%–78%), followed by the dorsum and lateral borders of the tongue, the anterior part of the hard palate, the labial mucosa, and gingiva, often appearing at several locations ¹⁵.

Diagnosis of BMS may be complex for three main reasons ⁷:

1. BMS is positively defined only by symptom(s) without regard to signs or etiologies
2. The symptomatic triad rarely occurs simultaneously in same patient
3. Overlapping or overwhelming stomatitis may confuse the clinical presentation.

As a result, clinicians can arrive at a diagnosis of BMS by matching specific details of the main complaint with clinical oral findings that exclude oral mucosal changes. The diagnostic criteria developed by some authors for the diagnosis of BMS are as follows ¹:

- Fundamental criteria: Daily deep burning sensation of the bilateral oral mucosa, Burning sensation for at least 4-6 months, Constant intensity or increasing intensity during the day, No worsening on eating or drinking. Instead, the burning sensation may reduce, No interference with sleep.
- Additional criteria: Dysgeusia and/or xerostomia, Sensory or chemosensory alteration, Mood changes or psychopathological alterations.

Pain that gets worse over the day decreased pain on eating and with sleep absence of clinical finding, presence of abnormal or dysgeusia tastes, usually metallic, bitter or sour, and complaint of dry mouth in presence of normal flows are other findings which help in diagnosis of BMS ¹⁶. During an examination, if the dentist notices any trigger point and does not treat it surgically or prosthetically, the patient will not be able to use his/ her denture comfortably. Some patients who typically examine their mouth and are worried about the emergence of normal anatomic details and neoplastic changes will sooner or later show psychogenic symptoms. After a careful examination, concerns should be eliminated with regular controls. Asymptomatic "burning mouth" may occur in patients with depression.

Problems with dentures are important factors in the burning symptoms. Inadequate denture retention and stability can induce abnormal tongue activity and become a habit to retain the denture. Denture extensions and in adequate freeway space increase load on the denture bearing areas which results of burning mouth sensation ¹⁷. It is clinically helpful if patients find that removal of the denture relieves their symptoms.

Dryness from low saliva flow can lead to fungal infections. Additionally, poor lubrication causes sticking of the tongue, cheeks and palate, also sometimes leading to a burning sensation ¹⁸. Some denture wearers may have an allergic reaction to the denture materials, resulting in oral burning.

Treatment - The multiple etiologic factors for treatment of BMS present a challenging scenario for the dental clinician. In the absence of any identifiable cause of BMS pharmacologic therapy has been suggested. Medications used for BMS include antifungal, antibacterial, corticosteroids, analgesics, sialagogues, vitamin mineral replacements. Estrogen replacement no therapies [ERT] have reported reduced oral symptoms in post-menopausal women. Control of parafunctional activity, prosthesis adjustment in case of patient wearing prosthesis ¹⁹.

But before starting the treatment, it is important to inform the patient about nature of disease and give reassurance. Patient management involves a differential diagnosis for BMS and the discrimination between "primary BMS" and "secondary BMS" based on the identification of possible etiologic factors for the syndrome. The most used medications to treat this syndrome are antidepressants, antipsychotics, sedatives, antiepileptics, analgesics and oral mucosa protectors, sialagogues, and vitamin-mineral replacements. Various alternative treatment modalities have also been implicated, which includes lasers, acupuncture, behavioral therapies, yoga, relaxation therapy, meditation, group psychotherapy, and electroconvulsive therapy; the purpose of these medications is to reduce the suffering of the patients and to bring their condition under better control and improve the quality of life ²⁰.

The best treatment for the syndrome consists of a combination of drugs, such as clonazepam, gabapentin, and baclofen. Some authors reported significant reduction in pain with topical application of clonazepam in patients with BMS ²¹. Others suggested the use of cognitive behavioral therapy for BMS patients ²². They found reduction in pain intensity following cognitive behavioral therapy (CBT) immediately, following therapy. Other authors found the combination of CBT, alpha lipoic acid, and/or clonazepam as the most promising ^{23,24}.

IV. Discussion

Problems with dentures are important factors in the burning symptoms. Inadequate denture retention and stability can induce abnormal tongue activity and become a habit to retain the denture extensions and in adequate freeway space increase load on the denture bearing areas which results of burning mouth sensation. It is clinically helpful if patients find that removal of the denture relieves their symptoms. Although the short-term follow-up studies may show potential symptomatic improvement with treatment in patients with BMS, the long-term outcomes for BMS remain unclear. In perspective, complete understanding of the etiology and pathogenesis is imperative to the development of novel and efficacious therapeutic strategies and will guide overall prognosis of the disease in the future.

V. Conclusion

Although different etiological theories have been proposed to explain primary burning mouth syndrome, none have received universal acceptance to date. BMS is a difficult and challenging problem for the dental practitioner. It is a clinical diagnosis made via the exclusion of all other causes. No universally accepted diagnostic criteria, laboratory tests, imaging studies or other modalities definitively diagnose or exclude BMS. The key to successful management is a good diagnostic work-up and coordination between the prosthodontic practitioners and appropriate physicians and psychologists. All this together will help prosthodontics practitioners to better diagnose and treat the BMS.

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