

# Burning Mouth Syndrome: A Comprehensive Analysis from Different Perspectives

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**Abstract:** *The burning mouth syndrome (BMS) is an oral disorder that is characterized by the burning sensation in the mouth without any organic reasons. Although the cause of BMS is still unknown. Its etiology is considered to be multifactorial suggesting a complex association of biological and psychological factors. It is reported prominently in middle aged patients and postmenopausal women and is characterized by an intense burning type of pain, preferably over the tongue and in other areas of the oral mucosa. BMS is a challenge to diagnose and manage as the symptom of oral burning is also reported in various pathological conditions therefore it is very important to differentiate between symptoms of oral burning and BMS. This article provides an overview of the some of the recent understandings of etiopathogenesis of BMS as well as the role of pharmacotherapeutic management in this disorder.*

**Keywords:** BMS, depression, CBT

## 1. Introduction

Burning mouth syndrome (BMS) is an enigmatic orofacial pain condition that presents a burning, stinging, or itching sensation in oral mucosa of the mouth. A patient may feel that he/she has burnt the mouth with hot food and there may be a sour, bitter, or metallic taste in the mouth. The mouth may also feel dry and food may have less flavor. It is reported more in female patients and occur predominately post-menopausal, although men and pre/peri-menopausal women may also be affected. The onset of BMS is usually gradual with no known precipitating factor or event.

### Definition

The BMS has been defined principally by the quality or location of the pain. The International Association for the study of Pain (IASP) defines BMS as "A pain of at least 46 months duration located on the tongue or other oral mucosal membranes associated with normal clinical or laboratory findings". The International Headache Society (IHS) in the International Classification of Headache Disorders II classifies BMS in the category of cranial neuralgias and central causes of facial pain within the subcategory of central causes of facial pain. According to the IHS, burning mouth syndrome is "an intraoral burning sensation for which NO dental or medical cause is found".

### Synonyms

The BMS is also known as Stomatodynia, Stomatopyrosis, Oral dysesthesia, Sore mouth and Sore tongue. The most affected area is the tongue (tip and lateral borders) thus denominated the terms Glossodynia (painful tongue), Glossopyrosis (burning tongue) and Glossalgia. Authors prefer to use the term 'syndrome' to refer to this entity due to the frequent association of burning sensation in oral cavity with other symptoms like xerostomia and taste

alterations. BMS was first categorized as a distinct disease in 2004 by the International Headache Society, which defined primary BMS as "an intraoral burning sensation for which no medical or dental cause can be found."

### Epidemiology

Majority of patients with burning mouth syndrome are middle aged women in postmenopausal phase. The female/male ratio of occurrence of BMS is found to be 7:1. The prevalence of BMS as reported from international studies ranges from 0.6% to 15%. Its prevalence in the general population is 3.7% (1.6% men and 5.5% women). BMS usually presents 3 years before to 12 years following menopause and rarely occur before the age of 30.

### Classification

Scala A *et al.* (2003) have proposed two classification schemes. The first is primary or idiopathic BMS, for which organic local/systemic causes cannot be identified and another is secondary BMS resulting from local/systemic pathological conditions and thus this form responds well to the etiology directed therapy. According to Lamey and Lamb (1994) the BMS can be divided into three clinical types depending on the diurnal fluctuations of symptoms. They are:

**Type 1 BMS** (35%) are symptom-free upon awakening with worsening symptoms throughout the day and variable symptoms at night.

**Type 2 BMS** (55%) is defined by continuous symptoms in the day but none at night.

**Type 3 BMS** (10%) have intermittent symptoms interspersed with symptom-free days.

Type 1 BMS is linked to nutritional deficiencies and diabetes, type 2 to chronic anxiety, and type 3 to dietary or prosthetic allergies.

## 2. Symptoms

**BMS** Occurs most commonly, but not exclusively in females though occurs in men as well.

- 1) Pain is chronic and there is absence of any organic disease.
- 2) Symptoms may vary from mild-to-severe but moderate pain is seen frequently.
  - Symptoms may appear early in the morning or develop later in the day.
  - Oral mucosa appears apparently normal without any visible changes.
  - Xerostomia
  - Geographic and fissured tongue
  - Painful teeth, jaw and temporomandibular joint
  - Loss of a comfortable jaw position and uncontrollable
  - Jaw tightness
  - Headache, neck and shoulder pain
  - Increased para functional activity
  - Difficulty in speaking, nausea, gagging and
  - Dysphagia
  - Multiple mood and emotional disturbances

### Etiology

Actual cause for BMS is still unknown. Experts believe that primary BMS is caused by damage to the nerves that control pain and taste while secondary BMS results from local or systemic pathological conditions [10]. Common causes of secondary BMS include hormonal changes (such as from diabetes or thyroid problem), Allergies to dental products, dental materials (usually metals), or foods, Dry mouth also known as **xerostomia** which can be caused by certain disorders (such as Sjögren's syndrome) and treatments (such as certain drugs and radiation therapy), Certain medicines, such as those that reduce blood pressure. There might be nutritional deficiencies (such as iron, zinc, folate (vitamin B-9), thiamin (vitamin B-1), riboflavin (vitamin B-2), pyridoxine (vitamin B-6) and cobalamin (vitamin B-12) which may affect oral tissues and cause a burning mouth, Chances are also that there is infection in the mouth, such as a yeast infection and finally acid reflux might also contribute to BMS.

The etiology of BMS is multifactorial, involving various local, systemic, and/or psychogenic causes. Female gender, peri-menopause, depression and anxiety, Parkinson's disease, and chronic medical conditions including gastrointestinal and urogenital diseases are risk factors for developing BMS. However, it is believed to be a form of neuropathic pain. This means that nerve fibers in the mouth might be functioning abnormally and transmitting pain despite the fact that there is no painful stimulus. It is also suggested that the nerves in the mouth that are responsible for feeling pain are easily stimulated and excited. Other factors which contribute to BMS may include menopause, TMJ problems, chronic fatigue syndrome and

fibromyalgia. Some patients also report trouble while going to sleep and staying asleep throughout the night. Patients also often report other symptoms such as headache, fatigue, shoulder pain, back pain, irritable bowel syndrome, burning of the skin or genital area, panic attacks, palpitations and ringing in the ears. BMS is not caused by dentures or infections although wearing dentures sometimes makes the burning worse.

### Psychological Factors

The disorder has been associated with several psychiatric diseases. Depression or anxiety occurs in more than 50% of BMS patients, with depression predominating. ), adverse life events (loss of job, death of family member or spouse), psychiatric disorders (such as anxiety, depression, and post-traumatic stress disorder), Personality disorders are also linked to BMS, affecting 86% of sufferers compared to 24% of normal individuals, with significant predilection to Cluster A disorders. Most recently, a cross-sectional controlled study showed that BMS patients have a significantly higher frequency of past or present major depressive disorder, general anxiety disorder, hypochondria, and cancerophobia. Although psychiatric disease was initially considered as a primary cause of BMS, it is now considered a concurrent or secondary factor as there is no definite correlation between the onset of BMS and stressful events and many other causes of BMS have been identified. Successful life may sometimes play a role in onset of this disorder (Bogetto et al., 1998). Stress leads to production of free radicals and increased cortisol levels which can degrade ordinary T 3 to form reverse T3 that has action opposite to that of T 3 required for taste function (Femiano et al.). Lack of soreness during sleep and increase in symptoms during day are just indicators that syndrome may have psychological genesis. BMS is considered a chronic pain disorder that adversely affects quality of life. BMS is a diagnosis of exclusion, i.e. all other explanations for the symptoms are ruled out before the diagnosis is made.

### Tests and diagnosis

There's no one test that can determine to prove burning mouth syndrome. Still some tests are suggested as **Blood tests, Oral cultures or biopsies, Allergy tests, salivary measurements, Gastric reflux tests and imaging.**

## 3. Treatment and Management

The goal of treating BMS is to first identify the underlying etiology, then to try to reduce or eliminate the etiology thoroughly. Attempting combinations of therapies may be appropriate as there is no definitive cure. The treatment can thus comprise of medical management, home remedies and self- help measures.

### 3.1 Medical Management

Primary BMS	Stage I	Stage II
Behavioral interventions: Cognitive Behavioural therapy by a clinical psychologist.	<b>Topical therapy</b>	<b>Systemic therapy</b>
	Clonazepam, a benzodiazepine, when applied as 0.5-1 mg 2-3 times daily, acts by locally disrupting the neuropathologic mechanism that underlies stomatodynia. But it decreases the density and/or ligand affinity of peripheral benzodiazepine receptors.	Clonazepam, a benzodiazepines, exert its effect by acting as a sedative hypnotic 0.25-2 mg dosage/day, 0.25 mg at bedtime, increase dosage by 0.25 every 4-7 days until oral burning is relieved or side effects occur.
	Chlordiazepoxide, a benzodiazepine, works by slowing down the movement of chemicals in the brain. This results in a reduction in nervous tension (anxiety) and muscle spasm, and also causes sedation.	Amitriptyline, a tricyclic antidepressant, is given in doses of 10-150 mg/day, to start with 10 mg at bedtime and increase the dose by 10 mg until oral burning is relieved or side effects occur.
	Capsaicin induces desensitization to thermal, chemical and mechanical stimuli by inducing selective and reversible desensitization of the afferent sensory C fiber endings. It is used as mouth rinse one teaspoon of a 1:2 dilution or higher of hot pepper and water	Chlordiazepoxide, a benzodiazepine, is advised 10-30 mg/day, to start with 5 mg at bedtime and increase the dose to 5 mg every 4-7 days until oral burning is relieved.
	Oral lidocaine has also been used topically for relieving the burning sensation.	Gabapentin, an anticonvulsant drug, is advised 300-1,600 mg/day; 100 mg at bedtime. The dosage is increased by 100 mg every 4-7 days until oral burning is relieved or side effects occur. 25
		Alpha lipoic acid is a mitochondrial coenzyme, trometamol salt of thioctic acid. It has antioxidant effect that eliminates the toxic free radicals produced in stress. It has neuroprotective property; hence, used to manage these patients.
		Acupuncture appears to be the current valid therapeutic choice as it influences oral microcirculation, resulting in a significant variation of the vascular pattern associated with significant reduction of the burning sensation as long as 18 months Low level laser therapy may be an alternative treatment for the relief of oral burning in patients with BMS.28
		Low level laser therapy may be an alternative treatment for the relief of oral burning in patients with BMS.

### 3.2 Secondary BMS

**Table 1:** Possible conditions and management of BMS

Conditions	Characteristic Patterns	Management
1. Mucosal disease (e.g., lichen planus, candidiasis)	Variable pattern Sensitivity with eating	Establish diagnosis and treat mucosal condition.
2. Menopause	Onset associated with climacteric symptoms	Hormone replacement therapy (if otherwise indicated)
3. Nutritional deficiency (e.g., vitamins B <sub>1</sub> , B <sub>2</sub> or B <sub>6</sub> , zinc, others)	More than one oral site usually affected Possibly, mucosal changes	Oral supplementation
4. Dry mouth (e.g., in Sjögren's syndrome or subsequent to chemotherapy or radiation therapy); altered salivary content	Alteration of taste Sensitivity with eating	High fluid intake Sialagogue
5. Cranial nerve injury	Variable pattern Usually bilateral Decreased discomfort with eating	Central pain control: benzodiazepine, tricyclic antidepressant, gabapentin (Neurontin) Local desensitization: topical capsaicin
6. Medication effect	Onset related to time of prescription	If possible, change medication.

**Table 2:** Different studies showing multifactorial management protocols for BMS.

1. Grushka <i>et al.</i>	Used combination of drugs, such as clonazepam, gabapentin and baclofen
2. Gremeau Richard	Reported significantly reduction in pain with topical application of clonazepam
3. Heckmann SM <i>et al.</i>	Patients on clonazepam (0.5 mg/day) were significantly improved in pain rating as compared to placebo (lactose)
4. Sardella A <i>et al.</i>	Investigated the effect of <i>Hypericum perforatum</i> (popularly known as St. john's wort) extracts in patients.
5. Epstein and Marcoe	Topical capsaicin: The use of hot pepper sauce (a good source of capsaicin) in water in the ratio of 1:2 is also found to be effective in reducing oral pain in BMS
6. Volpe <i>et al.</i>	Hormone replacement therapy (HRT), in his study on postmenopausal women, found that 12 out of 22 patients experienced improvement in oral symptoms after estradiol based treatment.
7. Femiano <i>et al.</i>	High fluid diet Nutritional supplements and antioxidative therapy. Use of alpha lipoic acid in management of BMS
8. Cavalcanti DR <i>et al.</i>	Didn't find effectiveness of alpha lipoic acid, in comparison with the control group given placebo, in the management of BMS
9. Lopez Jorner P <i>et al.</i>	Alpha lipoic acid group (800 mg/day for 8 weeks) and placebo group.
10. Bergdahlet <i>et al.</i>	Suggested the use of cognitive behavioural therapy for BMS patients. He found reduction in pain intensity following CBT immediately, following therapy
11. Mock D <i>et al.</i> and Reamy BV <i>et al.</i>	found the combination of cognitive behavioural therapy (CBT), alpha lipoic acid, and/or clonazepam as the most promising approach for the treatment of burning mouth syndrome
12. Mínguez Serra MP <i>et al.</i>	They found that capsaicin and clonazepam, administered systemically via the oral route, can be discarded because of their adverse reactions. Gabapentin didn't show its efficacy in alleviation of pain while alpha lipoic acid appeared useful, but it loses its efficacy over time. Benzidamine and trazodone were not found to be better than placebo in the treatment of BMS. Topical clonazepam presently seems to be the best option, with healing of almost half of all patients (40%)
13. Sengupta P	Work "Health Impacts of Yoga and Pranayam: A State of the Art Review", found beneficial health impact of yoga in treatment of depression, mood alterations, neuro hormonal activity, diabetes, and coronary atherosclerosis. But, further long term clinical trials are needed to document the effects of yoga, especially in management of burning mouth syndrome.
14. Femiano <i>et al.</i>	Noted a statistically significant symptom improvement with cognitive psychotherapy (40%), alpha lipoic acid (81%), and combination therapy (90%) compared to pill placebo control group (13%) of patients with BMS.

### Home remedies and self- help measures

Many patients with BMS show reduction or disappearance of symptoms during meals or when chewing gum or if other confectionary is used. Some other useful tips to reduce symptoms of BMS are:

- Avoidance of tobacco products
- Avoidance of products with cinnamon or mint
- Drinking water frequently
- Suck on Ice
- Abstaining from juices & fruits
- Brushing teeth with baking soda & water.
- Avoiding spicy & hot food, and also mouthwashes that contain high acidity level.
- Avoidance of acidic foods and liquids
- Practice of relaxation exercise such as yoga or meditation.
- By engaging in recreational activities such as exercise and hobbies.
- Being socially active by connecting with family members and friends.

### 4. Conclusion

BMS still remains a challenging medical condition to treat, and further research is also required to determine the true efficacy of current management strategies for patients with this disorder. Treatment of BMS is highly individualized and is depending on the particular signs and symptoms and on the underlying causes which needs to be identified. Psychological interventions that help patients to cope with symptoms may be of some use, but promising and new approaches to treatment still need to be evaluated. The key

to successful management should be good diagnostic work up and a promising coordination between an Otorhinolaryngologist and appropriate physicians and psychologists.

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