


# Burning Mouth Syndrome

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**Burning mouth syndrome is characterized by a burning sensation in the tongue or other oral sites, usually in the absence of clinical and laboratory findings. Affected patients often present with multiple oral complaints, including burning, dryness and taste alterations. Burning mouth complaints are reported more often in women, especially after menopause. Typically, patients awaken without pain but note increasing symptoms through the day and into the evening. Conditions that have been reported in association with burning mouth syndrome include chronic anxiety or depression, various nutritional deficiencies, type 2 diabetes (formerly known as non-insulin-dependent diabetes) and changes in salivary function. However, these conditions have not been consistently linked with the syndrome, and their treatment has had little impact on burning mouth symptoms. Recent studies have pointed to dysfunction of several cranial nerves associated with taste sensation as a possible cause of burning mouth syndrome. Given in low dosages, benzodiazepines, tricyclic antidepressants or anticonvulsants may be effective in patients with burning mouth syndrome. Topical capsaicin has been used in some patients. (Am Fam Physician 2002;65:615-20,622. Copyright© 2002 American Academy of Family Physicians.)**

 A patient information handout on burning mouth syndrome, written by the authors of this article, is provided on page 622.

**B**urning mouth syndrome has been defined as burning pain in the tongue or oral mucous membranes, usually without accompanying clinical and laboratory findings.<sup>1,2</sup> In the past few years, some investigators have disputed this definition, arguing that it is too restrictive and suggesting that the syndrome may exist coincidentally with other oral conditions.<sup>3</sup>

There has also been no clear consensus on the etiology, pathogenesis or treatment of burning mouth syndrome.<sup>4</sup> As a result, patients with inexplicable oral complaints are often referred from one health care professional to another without effective management. This situation not only adds to the health care burden of these complaints but also has a significant emotional impact on patients, who are sometimes suspected of imagining or exaggerating their symptoms.

This article provides updated information on burning mouth syndrome and presents a new model, based on taste dysfunction, for its pathogenesis. Current treatment options are discussed, although data on the effectiveness of these treatments remain limited.

## Epidemiology

Based on the makeup of most studies published to date, oral burning appears to be most prevalent in postmenopausal women.<sup>5</sup> It has been reported in 10 to 40 percent of women presenting for treatment of menopausal symptoms.<sup>6</sup> These percentages are in contrast to the much lower prevalence rates for oral burning in epidemiologic studies (0.7 to 2.6 percent).<sup>7</sup> The reason for the gender difference between study populations (approximately 85 percent of study subjects have been women) and epidemiologic studies (which demonstrate a more equal distribution of oral burning in men and women) may be related to the definition used in each study design.

## Pain Characteristics

In more than one half of patients with burning mouth syndrome, the onset of pain is spontaneous, with no identifiable precipitating factor. Approximately one third of patients relate time of onset to a dental procedure, recent illness or medication course (including antibiotic therapy). Regardless of the nature of

*Burning mouth pain is often absent during the night but progressively increases throughout the day and into the evening.*

pain onset, once the oral burning starts, it often persists for many years.<sup>8</sup>

The burning sensation often occurs in more than one oral site, with the anterior two thirds of the tongue, the anterior hard palate and the mucosa of the lower lip most frequently involved.<sup>5</sup> Facial skin is not usually affected. No correlation has been noted between the oral sites that are affected and the course of the disorder or the response to treatment.

In many patients with the syndrome, pain is absent during the night but occurs at a mild to moderate level by middle to late morning. The burning may progressively increase throughout the day, reaching its greatest intensity by late afternoon and into early evening.<sup>8</sup> Patients often report that the pain interferes with their ability to fall asleep. Perhaps because of sleep disturbances, constant pain, or both, patients with oral burning pain often have mood changes, including irritability, anxiety and depression.<sup>2</sup> Earlier studies frequently minimized the pain of burning mouth syndrome, but more recent studies

have reported that the pain ranges from moderate to severe and is similar in intensity to toothache pain.<sup>9</sup>

Little information is available on the natural course of burning mouth syndrome. Spontaneous partial recovery within six to seven years after onset has been reported in up to two thirds of patients, with recovery often preceded by a change from constant to episodic burning.<sup>5,10</sup> No clinical factors predicting recovery have been noted.

Most studies have found that oral burning is frequently accompanied by other symptoms, including dry mouth and altered taste.<sup>5</sup> Alterations in taste occur in as many as two thirds of patients and often include complaints of persistent tastes (bitter, metallic, or both) or changes in the intensity of taste perception. Dysgeusic tastes accompanying oral burning are often reduced by stimulation with food.<sup>5,8</sup> In contrast, application of a topical anesthetic may increase oral burning while decreasing dysgeusic tastes.

### **Etiologic Factors**

Because of a long-standing difficulty in understanding the pain of burning mouth syndrome and its complex clinical picture, a number of etiologies have been suggested. However, each of these postulated causes explains the pain in only small groups of patients. With the recently increased understanding of the role that taste damage plays in the pathogenesis of burning mouth syndrome, many of these etiologies can now be viewed as part of a larger model of disease.

### **PSYCHOLOGIC DYSFUNCTION**

Personality and mood changes (especially anxiety and depression) have been consistently demonstrated in patients with burning mouth syndrome and have been used to suggest that the disorder is a psychogenic problem.<sup>11</sup> However, psychologic dysfunction is common in patients with chronic pain and may be the result of the pain rather than its cause.

The reported success of biobehavioral tech-

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niques in the treatment of burning mouth syndrome may be related more to an improvement in pain-coping strategies than to a “cure” of the disorder.<sup>12</sup> Similarly, the usefulness of tricyclic antidepressants and some benzodiazepines may be more closely related to their analgesic and anticonvulsant properties, and to the possible effect of benzodiazepines on taste-pain pathways.<sup>13,14</sup>

#### SYSTEMIC AND LOCAL FACTORS

Although burning mouth syndrome has not been linked to any specific medical condition, associations with a wide variety of concurrent health conditions and chronic pain conditions, including headaches and pain in other locations, have been documented. Patients with burning mouth syndrome often have high blood glucose levels, but no consistent or causal relationship has been documented.<sup>15</sup> Nutritional deficiencies (vitamins B<sub>1</sub>, B<sub>2</sub> and B<sub>6</sub>, zinc, etc.) are other findings that are not consistently supported by the literature.<sup>5</sup>

Despite reports suggesting a significant relationship between burning mouth syndrome and mucosal ulcerative or erosive lesions, periodontitis and geographic tongue,<sup>16</sup> most studies have reported no significant changes in intraoral soft or hard tissues.<sup>8,9</sup> Similarly, chemical irritation and allergic reactions to dental materials and galvanic currents between dissimilar metals have not been found to be important causes of burning mouth syndrome.<sup>16</sup>

#### HORMONAL CHANGES

Hormonal changes are still considered to be important factors in burning mouth syndrome,<sup>5</sup> although there is little convincing evidence of the efficacy of hormone replacement therapy in postmenopausal women with the disorder.<sup>17</sup> Approximately 90 percent of the women in studies of the syndrome have been postmenopausal, with the greatest frequency of onset reported from three years before to 12 years after menopause.<sup>8</sup>

*Damage to the cranial nerves that serve taste function is thought to decrease the inhibition of trigeminal-nerve pain fibers, which can lead to oral burning symptoms.*

#### DRY MOUTH

It is not surprising that dry mouth has been suggested as an etiologic factor, in view of the higher incidence of this problem in patients with burning mouth syndrome.<sup>8,9</sup> However, most salivary flow rate studies in affected patients have shown no decrease in unstimulated or stimulated salivary flow.<sup>5</sup> Studies have demonstrated alterations in various salivary components, such as mucin, IgA, phosphates, pH and electrical resistance.<sup>5</sup> The relationship of these changes in salivary composition to burning mouth syndrome is unknown, but the changes may result from altered sympathetic output related to stress,<sup>6</sup> or from alterations in interactions between the cranial nerves serving taste and pain sensation.<sup>18</sup>

#### TASTE FUNCTION

The role of taste in burning mouth syndrome is not straightforward, although recent studies by one set of investigators<sup>19</sup> demonstrated a possible relationship between taste activity and the disorder. There is an increased prevalence of so-called “supertasters” (persons with enhanced abilities to detect taste) among patients with burning mouth syndrome.

Supertasters would be more likely to be affected by burning pain syndrome because of their higher density of taste buds, each of which is surrounded by a basket-like collection of the pain neurons of the trigeminal nerve (cranial nerve V).<sup>20</sup> This model would also explain the lack of effect of hormone replacement therapy once neural damage has already occurred.

Other investigations have found that the ability to detect bitter taste decreases at the time of menopause.<sup>21</sup> This reduction in bitter taste at the chorda tympani branch of the facial nerve (cranial nerve VII) results in intensification of

taste sensations from the area innervated by the glossopharyngeal nerve (cranial nerve IX) and the production of taste phantoms.<sup>22</sup> It has been suggested that damage to taste might also be associated with loss of central inhibition of trigeminal-nerve afferent pain fibers, which can lead to oral burning symptoms.<sup>19</sup>

#### OTHER POSSIBLE CAUSES

Case reports have linked burning mouth symptoms to the use of angiotensin-converting enzyme (ACE) inhibitors.<sup>23-25</sup> Once these medications were reduced or discontinued, oral burning was found to remit within several weeks. Interestingly, loss of taste sensation has also been reported with the use of ACE inhibitors.<sup>23</sup>

Candidal infections are also purported to cause burning mouth syndrome. Although candidiasis can cause burning pain, its prevalence has not been found to be increased in patients with the disorder compared with control populations.<sup>5,8</sup>

#### Management

The clinical history is helpful in diagnosing burning mouth syndrome. Most patients with the disorder report an increase in pain intensity from morning to night, decreased pain with eating, oral dryness that waxes and wanes with the burning, and the frequent presence of taste disturbances.<sup>8</sup> Even when a patient reports typical features of burning mouth syndrome, other potential causes should be ruled out (*Table 1*).

If burning persists after management of systemic or local oral conditions, a diagnosis of burning mouth syndrome can be considered, and empiric treatment for sensory neuropathy may be offered. Although not widely available, specific techniques can be used to test for taste disturbance and salivary function. Referral to a subspecialist with expertise in this area may be beneficial in particularly difficult cases.

The treatment of burning mouth syndrome is usually directed at its symptoms and is the

**TABLE 1**  
**Possible Causes and Management of Burning Mouth Symptoms**

<i>Condition</i>	<i>Characteristic pattern</i>	<i>Management</i>
Mucosal disease (e.g., lichen planus, candidiasis)	Variable pattern Sensitivity with eating	Establish diagnosis and treat mucosal condition.
Menopause	Onset associated with climacteric symptoms	Hormone replacement therapy (if otherwise indicated)
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
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
Cranial nerve injury	Variable pattern Usually bilateral Decreased discomfort with eating	Central pain control: benzodiazepine, tricyclic antidepressant, gabapentin (Neurontin) Local desensitization: topical capsaicin
Medication effect	Onset related to time of prescription	If possible, change medication.

same as the medical management of other neuropathic pain conditions (Table 2). Studies generally support the use of low dosages of clonazepam (Klonopin),<sup>26</sup> chlordiazepoxide (Librium)<sup>13</sup> and tricyclic antidepressants (e.g., amitriptyline [Elavil]).<sup>27</sup> Evidence also supports the utility of a low dosage of gabapentin (Neurontin).<sup>28</sup> Studies have not shown any benefit from treatment with selective serotonin reuptake inhibitors or other serotonergic antidepressants (e.g. trazodone [Desyrel]).<sup>29</sup>

Although benzodiazepines might exert their effect on oral burning by acting as a sedative-hypnotic, this possibility appears to be unlikely because the maximal effect of clonazepam is usually observed at lower

*The medical management of burning mouth syndrome follows the example of other neuropathic pain conditions and includes low dosages of benzodiazepines, tricyclic antidepressants and anticonvulsants.*

dosages.<sup>3</sup> The beneficial effects of tricyclic antidepressants in decreasing chronic pain indicate that, in low dosages, these agents may act as analgesics.<sup>30</sup>

Topical capsaicin has been used as a desensitizing agent in patients with burning mouth syndrome.<sup>31</sup> However, capsaicin may not be palatable or useful in many patients.

**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 (Elavil) Nortriptyline (Pamelor)	10 to 150 mg per day	10 mg at bedtime; increase dosage by 10 mg every 4 to 7 days until oral burning is relieved or side effects occur
Benzodiazepines	Clonazepam (Klonopin)	0.25 to 2 mg per day	0.25 mg at bedtime; increase dosage by 0.25 mg every 4 to 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 (Librium)	10 to 30 mg per day	5 mg at bedtime; increase dosage by 5 mg every 4 to 7 days until oral burning is relieved or side effects occur; as dosage increases, medication is taken in three divided doses
Anticonvulsants	Gabapentin (Neurontin)	300 to 1,600 mg per day	100 mg at bedtime; increase dosage by 100 mg every 4 to 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 (see next column)	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.

\*—Burning mouth pain usually responds to dosages in the lower part of the given ranges. Some patients empirically appear to respond better to low-dose combinations of the medications in this table.

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