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Review article

Burning Mouth Syndrome in Association with Upper Denture Bearing Area

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ABSTRACT

Burning mouth syndrome (BMS) is characterized by burning, stinging, of the oral cavity in the absence of any organic disease. The etiopathogenesis of BMS is very complex. Although, there are some of local, systemic and psychological factors. The purpose of this study was to provide the practitioner with an understanding of all factors which may be responsible for oral burning, symptoms, and diagnosis and treatment modalities.

Keywords: Classification, Diagnosis, Pain management of BMS.

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INTRODUCTION

The patient with a complaint of a burning sensation of the oral mucosa presents one of the most difficult and complex challenges to the health care professionals. Burning mouth syndrome is a chronic pain disorder characterized by burning, stinging, and/or itching of the oral cavity in the absence of any organic disease.(1) The other names applied to BMS included that, burning mouth condition, sore mouth, sore tongue oral, glossopyrosis, glossodynia, stomatodynia, stomatopyrosis and dysesthesia.(2)

Anatomy and physiology of mouth cavity

The oral cavity is comprised of mucosa, glands, muscles, teeth and sensory receptors. The sensory abilities of the oral cavity exclude temperature, pain, proprioception, light touch, vibration, and taste. Efferent innervation supplies muscles of mastication, the tongue, and autonomic reflexes. The branches of the nerves which associated with oral cavity included that trigeminal nerve(V), glossopharyngeal nerve (IX) and facial nerve (VII).

Trigeminal nerve (V):

It has somatic motor, proprioceptive, and cutaneous sensory functions and supplies motor innervation to the muscles of mastication, one middle ear muscle, one palatine muscle, and two throat muscles. In addition to proprioception associated with its somatic motor functions, the trigeminal nerve also carries

proprioception from the temporomandibular joint, tongue, and cheek, which allows chewing food without biting your tongue or cheek. So damage to the trigeminal nerve may impede chewing. Distribution of the trigeminal nerve in the face is divided into three regions are ophthalmic, maxillary and mandibular.
The superior alveolar nerves are derived from the maxillary branch (V2) of the trigeminal nerve and they supply to the maxillary teeth, palate, and gingiva. The branch of these nerves as following: 1. Zygomaticotemporal nerve supplies anteriolateral part of temporal bone. 2. Zygomatico-facial nerve supplies the skin over the zygomatic arch. 3. infra-orbital nerve divided into three branches (palpebral, nasal and labial). The labial one gives sensation to the skin over maxilla including lower eyelid, lateral surface of the nose and mucous membrane of upper lip.

The Anterior division of roots of mandibular nerve (V3) is divided into

i. superficial branches are: 1. Auriculo-temporal nerve supplying posterior aspect of the skin of the lateral sides of the face. 2. Buccal nerve runs superficial to buccinator muscle supplying the skin covering the muscle and mucous membrane lining it.

ii. Deep branches: 1. The lingual nerve: Descends branch from the mandibular nerve to the undersides of the tongue and distributed in the floor mouth cavity. This nerve innervates the floor of the mouth, the ventral side of the tongue, taste buds on the anterior two thirds of the tongue, and the lingual gingiva. 2. Mylohyoid nerve supplies the mylohyoid muscle and the anterior belly of the digastrics muscle.3. The inferior alveolar nerve descends branch from the mandibular nerve and runs parallel to the lingual nerve and Enters through the mandibular foramen and runs via the mandibular canal. Inside the canal, the inferior alveolar nerve supplies the mandibular teeth (specifically the molars and the premolars), the gingiva, and the mucosa. Then sub divides into mental nerve branch and the incisive nerve. 4. Mental nerve emerges via mental foramen supplying the skin of the chin & mucous membrane of lower lip. 5. Incisive nerve branch innervates the anterior teeth and lower labial gingiva. iii. Greater auricular nerve (sensory) is a branch from cervical plexus (C2-C3) and supplies parotid gland and skin over the angle of the mandible.
The glossopharyngeal nerve (IX): also are somatic motor, sensory, parasympathetic ganglia. The somatic motor to one muscle of the pharynx and supplies parasympathetic innervation to the parotid salivary glands. The sensory is sense of taste in the posterior third of the tongue and supplies tactile sensory innervation from the posterior tongue, middle ear, and pharynx and transmits sensory stimulation from receptors in the carotid arteries, which monitor blood pressure and blood carbon dioxide, oxygen, and pH level .
The facial nerve (VII): supplies parasympathetic innervation to the submandibular and sublingual salivary glands of the mouth and to the lacrimal glands of the eye. It controls all the muscles of facial expression, a small muscle in the middle ear, and two hyoid muscles.

Taste
Taste from the anterior two-thirds of the tongue, except from the circumvallate papillae is carried by means of a branch of the facial nerve (VII) called the chorda tympani. The other taste from the posterior one-third of the tongue, the circumvallate papillae, and the superior pharynx is carried by means of the glossopharyngeal nerve (IX).

Salivation
Mechanical and gustatory stimuli incite parotid, submandibular, and sublingual salivary flow. In particular, stimulation to the anterior tongue is effective in activating submandibular and sublingual

glands, while posterior lingual stimulation is more effective at engaging parotid flow. Ions present in saliva, particularly sodium, produce continual low-level stimulation of taste receptors.
In theory, the content of saliva may affect sensitivity of taste receptors. This may explain how medications and metabolic conditions alter taste perception (dysgeusia) or produce novel tastes, such as bitter or metallic tastes in the mouth (parageusia.) Acute decreases in the quantity of saliva do not appear to affect gustatory sensitivity; however, chronic deprivation (as in Sjögren Syndrome or after radiation therapy) does appear to result in decreased sensitivity of receptors by trophic effects.

Classification of BMS:

Scala et al. classified BMS into two categories: Primary or essential/idiopathic BMS, in which local but systemic causes cannot be identified, and involving peripheral or central neuropath-logical pathways. Secondary BMS resulting from local, systemic or psychological factors. [3]

Etiopathogenesis

There are various factors related etiopathogenesis of BMS and have been divided into local, systemic and psychological. [4]

Local factors

Pseudomembranous and erythematous candidiasis have been associated with BMS.[5] This condition of BMS improved in 86% after using antifungal lozenges and 13% had complete elimination of their symptoms.[6] Also, Glossodynia may be caused by oral cancer, which is normally present on the lateral borders of the tongue or the oropharynx. Premalignant entities such as leukoplakia or erythroplakia may also present with burning or painful sensation. [7] Also, Dryness from low saliva flow can lead to fungal infections as reported by Blasberg et al.[8] Additionally, poor lubrication causes sticking of the tongue, cheeks and palate, also sometimes leading to a burning sensation.[9]
However, some denture wearers may have an allergic reaction to the denture materials, resulting in oral burning. [10] The most common allergens in prosthetic materials are (meth) acrylates and metals. The occupational allergic contact dermatitis also caused by (meth) acrylates is relatively common in dental stuff [11], whereas denture material-induced reactions to acrylates in dental patients are less common. [12] Allergy to acrylates is a rare cause of stomatitis (stomatitis venenata) in dental patients, [13] because dental prosthesis and fillings contain acrylates present in polymerized form that is non-sensitizing. [15] on other hand, contact dermatitis to metals å specially to nickel is frequent but oral eruptions due to nickel allergy are rare. [12]
The cytotoxic effects caused by denture base acrylic resins are mainly caused by the substances leaching out from these resins. The main substance which is leached out by the process of diffusion from these materials is the unreacted residual monomer.[16] Constant contact of saliva with the material cause's expansion of the openings present between the polymer chains causing the unreacted monomer to diffuse out. Thus, the substances which are leached out from the denture bases into the saliva are transferred to the oral structures causing adverse allergic reactions. [17]
The other Problems with dentures wearing are important factors in the burning symptoms as inadequate denture retention and stability can induce abnormal tongue activity and become a habit to retain the denture. [18] Denture extensions and in adequate freeway space increase load on the denture bearing areas which results of burning mouth sensation. [19] It is clinically helpful if patients find that removal of the denture reliefs their symptoms.
Applications of biopolymers in dentistry have become very frequent, and these materials offer properties and characteristics due to which they can be used for many purposes. Common uses of these materials include the fabrication of denture bases, orthodontic removable appliances, temporary crowns, and denture relining. [20] Whereas, the acrylic resin bases are used for removable partial or complete dentures and also for implant supported removable dentures.[21] Orthodontic appliances

made up of acrylic resin serve many purposes including space maintenance and arch expansion. [22] The use of acrylic temporary crowns is important during crown and bridge fabrication processes, and these provisional restorations are usually placed after tooth preparation using temporary luting cement. [23] Acrylic hard relining process is very useful in removable prosthodontics which helps in improving denture's retention, stability, and support. [24]

Systemic factors

There are many of natural deficiencies such as vitamin deficiencies as vitamin (B12, B6,C) and folic acid, anemia and low levels of zinc. Hormonal changes (reduced plasma estrogens), diabetes mellitus, hypothyroidism and immunological diseases have also been reported. Some medications can cause BMS such as: anti-histamines, neuroleptics some anti-hypertensive, anti-arrhythmic and benzodiazepines. [25]

Psychiatric factors

Psychiatric disorder form 44% of burning mouth patients as reported by previous study.[26] But the other study by Lamb et al [27] indicated that 60% of burning mouth patients had emotional factors and anxiety was most difficult to control.

Pathophysiology:

The pathophysiology of BMS has not been fully elucidated. Various studies have shown significant differences in thermal and nociception thresholds of patient with BMS compared to control subjects. [28] Thus, a neuropathic mechanism for BMS is currently favored. However, controversy remains over whether a peripheral or central dysfunction is responsible for BMS. Evidence in the literature links BMS to a peripheral neuropathy. Superficial biopsies of the anterolateral tongue from BMS patients showed a significantly lower density of epithelial and sub papillary nerve fibers than controls. Morphologic changes were consistent with axonal degeneration. This supports a trigeminal small fiber sensory neuropathy or axonopathy. [29]

Moreover, Borelli et al [30] found increased levels of nerve growth factor, a neuropeptide vital to nociceptive function in adults, in the saliva of BMS subjects. Other histopathologic studies of patients with BMS have shown increased density of TRPV1 ion channels and P2X3 receptors on scattered nerve fibers, a finding previously linked to hypersensitivity and neuropathic pain symptoms in various models of human pain conditions. [31] Additionally, dysfunction of the chorda tympani branch of the facial nerve may be involved in the pathogenesis of BMS. Patients with BMS will report improved symptoms with eating, suggesting that stimulation of the gustatory system decreases pain sensation. Finally, increased excitability or inhibition of the trigeminal system has been implicated as patients with BMS have greater alterations in blink reflexes compared to normal Subjects.[32]

Central neuropathic mechanisms have been demonstrated following thermal stimulation of the trigeminal nerve in patients with BMS. Patients with BMS show patterns of cerebral activity similar to those that appear in other neuropathic pain disorders, suggesting that the cerebral hypoactivity could be an important element in the pathogenesis of BMS .[33]

Clinical presentation

This condition predominantly affects middle-aged women in the peri- and post-menopausal period. Also, the men can be affected. The average female/male ratio of 7:1.[34] on other hand, this condition is extremely rare in patients under 30 years and never been reported in children and adolescence.[35]

The clinical manifestations of BMS are not constant and are always diverse and variable. Most of the time, patient found difficulty in describing the sensations they perceive, [36] and may vary as some patients can be oligosymptomatic (pain and dysgeusia or xerostomia) or monosymptomatic (pain only) usually associated with dry mouth, bitter/metallic or altered taste.[37]

In more than one-half of patients with BM, 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. Regardless of the nature of pain onset, once the oral burning starts, it often persists for a prolonged period. [38] The predominant pain character reported by BMS patients is a prolonged burning sensation of the oral mucosa described as moderate to severe intensity that may vary throughout the course of the day. [39] The mean severity of pain has been assessed at about 5-8 cm on a 10 cm visual analogue scale, where 0 cm represents "no pain" and 10 cm corresponds to the "worst possible pain. [40]

The pain typically relieves on intake of food or liquids, which is in contrast to burning symptom in other diseases; in which the pain aggravates. 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, localized to the oral cavity and does not radiate to other regions of the face. [41] 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. [42]

Dysgeusia is present in up to 70% of cases and may take the form either of a persistent taste in the mouth or altered perception of tastes. Dysgeusic tastes may be bitter, metallic, or mixed. Alterations may take the form of decreased perception of sweetness or intensified sensation of sweet or sour flavors. [43]

Xerostomia is also a symptom in up to 64% of patients. Patients may not volunteer symptoms of xerostomia but affirm it on direct questioning. Xerostomia in burning mouth syndrome (BMS) is unlikely to be objectively confirmed by quantitative tests of salivary function. Some evidence suggests differences in salivary composition. [44]

Burning mouth syndrome may be associated with various other nonspecific symptoms such as Bruxism or clenching, which may cause headache, ear, temporomandibular joint pain, or myofascial pain in masticatory, neck, shoulder, and supra-hyoid muscles that can be associated with BMS. Other signs of bruxism include worn tooth enamel, tooth sensitivity, or superficial ulceration of buccal mucosa. Also, Tongue thrusting and mood and emotional disturbances in patients with. [43]

Diagnosis and investigation:

The diagnosis of BM is based on the exclusion of all possible local, systemic and psychogenic factors that are known to cause burning mouth sensation. Local causes that may cause burning can include but are not limited to: Fungal infections (e.g., arising from poor hygiene, secondary to systemic conditions such as diabetes, or immunosuppression and xerostomia). Mechanical trauma (e.g., from poorly fitting prostheses, sharp edges of teeth, rough restorations). Thermal and chemical injury. Hypo-salivation/xerostomia (e.g., consequence of radiation therapy, or salivary gland disorders). Parafunctional habits (e.g., clenching, tongue thrusting). Also, Allergic contact stomatitis (e.g., secondary to denture base materials, e.g., monomer and other dental.

Systemic conditions that can cause oral burning include: Natural deficiencies Endocrine disorders. Immunological disorders as Sjögrens syndrome Gastroesophageal reflux disease and also medications that augment/induce burning (e.g. angiotensin converting enzyme inhibitors).[34] Psychogenic conditions may be causes oral burning include such as postmenopausal woman and death of close person.

It is very important to collect a detailed history of presenting illness including that: Pain location and characteristic, medical history and past current medications, intra-oral exam and it should also include looking for intraoral clinical signs of systemic diseases such as lichen planus.[34]

Laboratory investigation include Basic metabolic panel such as: CBC, Serum (B vit levels, folate, ferritin and blood glucose), Urine glucose analysis, TSH, T4, Thyroid binding globulin, anti(thyroperoxidase

antibodies and thyroglobulin) antibodies Anti-microsomal antibodies, LH, FSH, Sialochemistry, ESR, Anti (SS-A,SS-Ro, SS-B, and SS-La antibodies) RF, ANA, Biopsy of tongue or mucosa Fungal culture Imaging such as CT scans of the head may be useful if a mass lesion is suspected, MRI of the head, brain, and/or spinal cord may assist in diagnosing mass lesions. Also Patch testing with dental series containing the commonly used materials can be used to detect contact allergies to these dental materials. [45]

Treatment of BMS

BMS can be management by topical medications, systemic medications and behavioral interactions:

Topical application of capsaicin (0.025% cream) has been used as a desensitizing agent and is thought to inhibit substance P. [46] Trials have also been made on rinsing with 0.15% benzydamine hydrochloride, three times a day, having an analgesic, anesthetic, and anti-inflammatory effect, but with inconsistent results.[47] The topical application of clonazepam (by sucking a tablet of 1 mg), an agonist of gamma amino butyric acid receptors, 3 times a day for 14 days found some success in some. [48] Topical application of 0.5 ml *Aloe vera* gel at 70%, 3times a day combined with tongue protector is found to be effective for reducing the burning and pain sensation of tongue.[49] Topical lactoperoxidase (biotene mouthwash) and 5% doxepin were attempted and found to be ineffective. [50]

Systemic medications: The use of tricyclic antidepressants such as amitriptyline, desipramine, imipramine, clomipramine and nortriptyline (starting dose of 5-10 mg/day and gradually increases to 50 mg/day) are useful in treating BMS. Some authors contraindicate these drugs in patient with dry mouth. Selective serotonin reuptake inhibitor antidepressants like sertraline (50 mg/day), paroxetine (20 mg/day) for 8 weeks, duloxetine at a dose of 30-60 mg/daya dual action antidepressants that inhibit both serotonin and noradrenaline result in a significant improvement of oral burning sensation.[51]

Antipsychotics such as amisulpride, levosulpiride at a dose of 50 mg/day for 24 weeks proved to be effective and shows a better patient compliance when used in short duration. Alpha-lipoic acid (ALA) at a dose of 600 mg/day, either alone or in combination for 2 months, acts as an antioxidant and a powerful neuro-protective agent that prevents nerve damage by free radicals, regenerating other antioxidants such as vitamin C and E, able to increase the intracellular levels of glutathione, thereby significantly reduces the symptoms in patients with idiopathic dysgeusia. [52] Clonazepam (0.5 mg/day) and alprazolam (0.25 mg to 2 mg/day) are commonly used in the treatment of BMS pain and it acts by probably disrupting the underlying neuropathologic mechanism.[53]

Behavioral management: The bio-behavioral techniques in the treatment of BMS may be related more to an improvement in pain-coping strategies than to a "cure" of the disorder.[35] Similarly, the usefulness of tricyclic anti-depressants and some benzodiazepines may be more closely related to their analgesic and anti-convulsant properties, and to the possible effect of benzodiazepines on taste-pain pathways. [53]

Treatment of BM associated with wearing denture: Used of PMM in denture constriction for removed the sensitivity for resin. Relining for ill-fitted denture, correct vertical diminishing for denture and remake the old denture.

CONCLUSION

Within the limitations of this study, several conclusions can be carried out:

- Burning mouth is a painful and often frustrating condition to the patients.
- The etiopathogenesis of BMS often is complex and difficult to determine.
- Diagnosis is difficult and sometimes need to many investigation
- The management of BMS is included pharmacological and non-pharmacological interventions and is not an easy task for oral health care professionals.

RECOMMENDATION

- Used of good and improved method for making better diagnosis of BM
- Make connection with medical specialist in some cases if you need for better diagnosis.
- Users must be made aware that denture base resins and other materials used in dentistry not cause local and systemic side effects.

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