ORIGINAL ARTICLE

Study of Risk Factors for the Burning Mouth Syndrome in Patients Visiting the Khyber College of Dentistry Peshawar KPK: A Cross-Sectional Study

Zafar Iqbal[1]	**BDS, MCPS**
Nida Murad[2]	**BDS, FCPS Max Fax, MPhil**
Jamal Nasir[3]	**BDS**
Sheraz Alam[4]	**BDS, MPhil**
Hurriya Zahid[5]	**BDS, MPhil**

OBJECTIVES: This study aimed to describe the overall prevalence of BMS in both genders, the Co-variants or risk factors directly or indirectly associated with BMS, in patients visiting the Khyber College of Dentistry Peshawar KPK.

METHODOLOGY: A cross-sectional study was carried out on patients visiting the Department of Oral Medicine, Khyber College of Dentistry, Peshawar KPK, for examination and diagnosis of chronically suffering pain in the oral cavity from January 2018 to January 2019. Patients were thoroughly evaluated for Burning Mouth Syndrome. Non-probability convenient sampling technique was used with a calculated sample size of 119 patients with the anticipated proportion of 0.09 and a 95% confidence interval. The age was divided into five-decade age sub-groups (20-30 years, 31-40 years, 41- 50 years, 51-60 years, and above 61 years).

RESULTS: The male-to-female ratio was found to be 2.75:1.67. The mean age group recorded was 51±8 years. The most common age group that presented with this discomfort was 51-60 years (45.37%). The nature of the pain associated with BMS was described as a burning sensation or discomfort in the majority of the patients (108, 90.75%). The frequency of the pain was in a continuous pattern (77, 64.70%). The common local factor found to be more associated with BMS in both genders was fissured tongue followed by xerostomia. The relation was significant between local factors and BMS with a p-value of 0.01. The most common systemic illness in males was diabetes, while most females were post-menopause. Psychologically females were more stressed (24, 20.16%) than males (13, 10.92%). The association of the psychological elements with BMS also carried a significant relationship (P=0.02)

CONCLUSION: The predominant age group for the presentation of the BMS in both genders was 51-60 years and the local and systemic risk factors were found to have a statistically significant relationship with the BMS. Among females, the most common local factor was candidiasis followed by xerostomia. More than one local factor was found to be involved in the genesis of BMS. The systemic factor was also found to have a significant relationship with BMS.

KEYWORDS: Burning Mouth Syndrome, Xerostomia, Fissured tongue, Anemia, Diabetes

HOW TO CITE: Iqbal Z, Murad N, Nasir J, Alam S, Zahid H. Study of risk factors for the burning mouth syndrome in patients visiting the khyber college of dentistry Peshawar KPK: a cross-sectional study. J Pak Dent Assoc 2024;33(2):48-53.

DOI: https://doi.org/10.25301/JPDA.332.48

Received: *30 January 2024*, ***Accepted:*** *04 June 2024*

INTRODUCTION

Although its clinical appearance lacks any universally accepted definition,[1] it is referred with different names as scalded mouth syndrome, stomatodynia, sore tongue, burning lip syndrome, oral dysesthesia, glossopyresis, etc is burning mouth syndrome (BMS).[1,2] The International Association for the Study of Pain[8] defines Burning Mouth Syndrome (BMS) as "burning pain in the tongue or other mucous membrane associated with normal signs and laboratory findings lasting at least 4-6 months." BMS is an idiopathic condition with unclear pathogenesis,[3] lack an appropriate and consistent classification, 4definitive diagnostic criteria, and awareness among oral health care professionals.[5] Thus, the only means of a definitive diagnosis of this condition is via an intricate history taking and exclusion of all other pathologies that mimic this condition.[6]

The overall prevalence of this condition from various

1. Assistant Professor, Department of Oral Medicine, Sardar Begum Dental College, Peshawar.
2. Assistant Professor, Department of Oral Biology, Peshawar Dental College, Peshawar.
3. Assistant Professor, Department of Oral Biology, Sardar Begum Dental College, Peshawar.
4. Associate Professor, Department of Oral Biology, Rehman College of Dentistry, Peshawar.
5. Assistant Professor, Department of Oral Biology, Sardar Begum Dental College, Peshawar.

Corresponding author: "Dr. Nida Murad" < murad_21_4@hotmail.com >

international studies ranges from 4% - 15%.[7,8]

It is a disorder of middle-aged and elderly individuals with an age range of 38-72 years.[3] It has never been reported in children and adolescents.[9] It exhibits more female predilection, especially in post-menopausal women, with male-to-female ratio varying from 3:1 to 16:1 in different literatures.[8,9,10] Although it is important to mention that such wide, variation has resulted from governing factors, like biological, physiological, and social factors.[9,11] BMS is categorized as Primary (essential/idiopathic) in which the local and systemic factors cannot be ruled out via history taking or examination or secondary in which there is significant association with local and systemic/ psychological factors.[10] Another classification divides BMS into three subtypes according to the variation in the pain (VAS) level over one day as follows: BMS Type 1: Burning increasing throughout the day and reaching its peak in the evening. BMS Type 2: complaint of continuous sensory disturbances. BMS Type 3: Intermittent symptoms with pain-free periods during the day.[11]

The clinical manifestation of BMS is variable and diversiform (burning, tingling, scalding, annoying, tenderness, or numbness).[12] In many situations, the patient is unable to describe the chronic nature of perceiving sensations with BMS.[13] Pain may be specific to some part of oral mucosa, often spontaneous and bilateral with no definite cause. It may accompany bitter/metallic taste (70%), Xerostomia, headaches, TMJ pain, stress, anxiety, depression, and less social contact with society.[14,15,16]

The aetiology of BMS is still debatable and multifactorial, with several local (reduced saliva flow, inflammation, parafunctional habits, etc) systemic (Anemia, diabetes, HCV, menopause, etc) and psychological factors (stress, anxiety, depression, panics, etc.) were strongly associated with BMS.[11,14]

The various laboratory tests should be the part of diagnostic criteria for BMS and they include a basic metabolic panel for glucose, serum iron level, antinuclear antibodies, complete blood count, cytological smear for candidiasis, salivary flow rate, skin test for allergy, MRI for exclusion of central nervous pathology.[14]

Once diagnosed with BMS, the treatment is still very challenging.[15] The practitioners try its level best to sway away the suffering of the patient in the form of topical (Clonazepam 1.0 mg, Capsicum rinse 0.02%, etc.) and systemic medication (Clonazepam 0.5-1.5mg, Gabapentin 300mg, Tricyclic antidepressants 10-30mg, Milnaciparin 15-100mg, etc.).[15] Non-pharmacological treatments include cognitive behavioral therapy and acupuncture, etc.[11,16] This study aimed to determine the prevalence of BMS among both genders and its associated factors in patients visiting the Khyber College of Dentistry. It helped the clinician to identify the potential risk factors for BMS and its timely prevention and management. This study has helped to identify areas for future investigations (associated factors) required for the accurate diagnosis of BMS.

METHODOLOGY

This cross-sectional study was carried out on patients visiting the Department of Oral Medicine, Khyber College of Dentistry, Peshawar KPK, for examination and diagnosis of chronically suffering pain in the oral cavity from January 2018 to January 2019. Ethical Approval was obtained from the Research and Development Cell, Khyber College of Dentistry via notification # 6087/RRB/KCD. Non-probability convenience sampling was used to collect the data for BMS. The calculated sample size was 119, using the anticipated population proportion of 0.09[7] with a confidence interval of 95% and a margin of error to be 0.05. Informed consent was obtained from all the patients willing to participate in the study. For proper diagnosis of BMS, it was necessary to record the demographic details (residence, age, gender, and occupation), etc. All details were taken on the specially designed proforma. To determine the age distribution for the BMS, the age was divided into five-decade age subgroups (20-30 years, 31-40 years, 41- 50 years, and 51-60 years, above 61 years). The patients were interviewed for the characteristics of pain, its origin, time of onset, site of onset, type of discomfort, and all the associated local (contact allergy, parafunctional habits, fissured tongue, lichen planus, candidiasis, depapillation of mucosa/tongue, etc.) and the systemic factors (Diabetes, post-menopause, anaemia, hypertension, etc.) were recorded on structured proforma. Before all the meticulous steps, written informed consent was taken from every participating individual. The exclusion criteria included, patients reporting connective tissue disorders (lupus erythematosus, rheumatoid arthritis, etc.), pain of odontogenic origin (reversible, irreversible pulpitis, periodontitis, crack tooth syndrome), recurrent aphthous ulceration, autoimmune disorders, pericoronitis, Trigeminal neuralgia, atypical facial pain etc because all these symptomatic conditions can be diagnosed via through certain objective tests. The inclusion criterion was defined by expert oral pathologist and maxillofacial surgeon, in the light of the International Association for the Study of Pain. It narrates the burning pain in the tongue or other mucosal areas associated with normal signs and laboratory findings lasting at least 4-6 months with no inference to sleep and did not get worsen on eating/drinking was diagnosed as BMS. The level of stress was recorded using the Perceived Stress Scale (PSS). After the formal completion of the proforma for BMS

the data was entered in SPSS version 16.0IBM, SPSS, to derive the frequency and percentages for all numerical variables. The categories of the other qualitative variables were used to derive the association of co-variants/risk factors associated directly or indirectly with BMS. The chi-square test was used to determine the relationship between local and systemic factors associated with BMS with the level of significance p≤0.05.

RESULTS

Among 119 patients, 67 males (56.30%) and 52 females (43.69%) were diagnosed with BMS. The overall male-to-female ratio was found to be 2.35:1.67. The mean age group for BMS was 51±8 years. Both genders have clearly shown (n=54, 45.37%), advancing age (51-60 years) was acting as a risk factor for the occurrence of BMS. Table 1

Table 1: Gender and Age distribution in BMS patients

Gender	Age of the patient (Frequency, percentage %)					
	20-30 years	31-40 years	41-50 years	51-60years	Above 61 years	Total
Male	0	14 (20.89%)	15 (22.38%)	26 38.80%)	12(17.91%)	67(56.31%)
Female	0	17 (32.69%)	6 (11.53%)	28 (53.84%)	2 (3.84%)	52(43.69%)
Total	0	31(26.05%)	21(17.64%)	54(45.37%)	14(11.76%)	119(100%)

In Table No 2 the nature, onset, frequency and site of the discomfort (pain) was calculated for both genders.

The majority of the patients described the nature of the pain associated with BMS to be a burning sensation. (n=108, 90.75%) and had slow onset (n=84, 70.59%). Table 2

Table 2: Frequency distribution for the Nature and Onset of pain associated with BMS in both genders

Frequency/per cent	Nature of pain	The onset of pain	Frequency Pattern of pain	Site of pain
	Tingling 10/ 8.40%	Slow 84/70.59%	Continuous 77/ 64.70%	Specific site 78/65.54%
	Burning 108/ 90.75%			
	Stinging 1/ 0.85%	Sudden 35/ 29.40%	Intermittent 42/ 35.29%	Non-specific 41/34.45%
Total	119/100%	119/100.0	119/ 100	119/ 100

The frequency of the pain expressed by the patients of BMS was in a continuous pattern (n=77, 64.70%) and the site of discomfort was specific (dorsum of tongue/ buccal mucosa) in a majority of cases (n=78, 65.54%). Table 2

The frequency of the local and systemic factors were shown in figure I and II.

The most common local factor found to be associated with BMS in both genders was fissured (n=37, 31.09%) tongue followed by xerostomia (n=36, 30.25%). The relation was found to be significant between local factors and BMS with a p-value of 0.01. Table 3

Figure 1: Local factors in patients with BMS

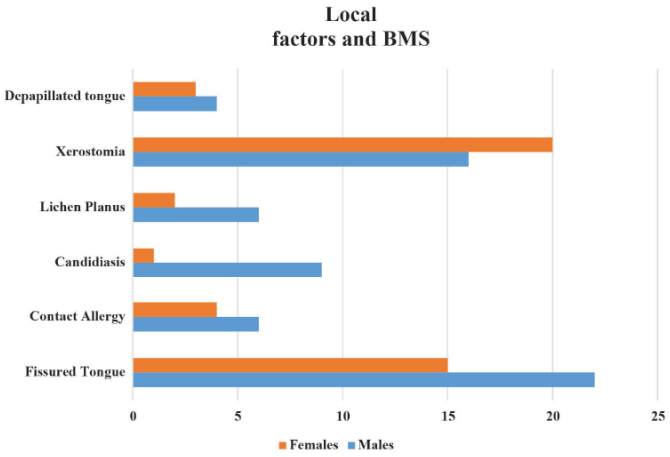
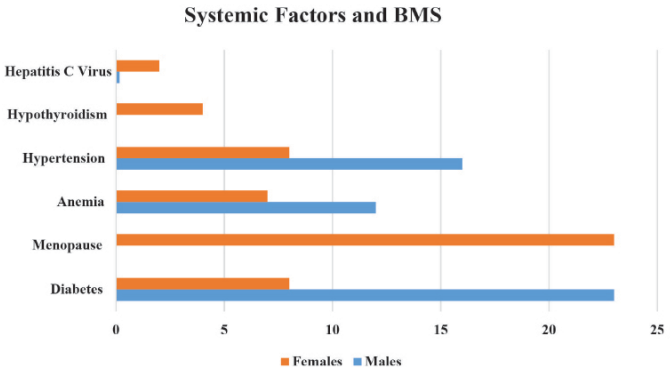


Figure 2: Systemic factors in patients with BMS



The most common systemic illness was diabetes (n=23, 19.32%) in males, while in females majority were at a post-menopausal stage. Table 3

Table 3: The distribution of local and systemic factors between both genders with BMS

Local Factors	Gender Male	Female	P value	Systemic Factors	Gender Male	Female	P value
Association of more than one lesion (xerstomia, LP ,Fissured tongue)	2 (3.84%)	1(1.92%)	0.01	Diabetes	3 (5.76%)	8 (15.38%)	0.001
Contact Allergy	2 (3.84%)	5 (9.61%)		Menopause	0	13 (25%)	
Parafunctional habits	0	1(1.92%)		Anemia	2 (3.84%)	7 (13.46%)	
Candidiasis	6 (11.53%)	5 (9.61%)		Hypertension	6 (11.53%)	9 (17.30%)	
Lichen Planus	1(1.92%)	0		Hypothyroidism	0	4 (7.69%)	
Xerostomia	0	11 (21.15%)		HCV	3 (5.76%)	2 (3.84%)	
Depapillated tongue	4 (7.69%)	3 (5.76%)					
Total	18	34		Total	18	34	

There was a significant relationship between systemic factors and BMS with a p-value of 0.001.

The Perceived Stress Scale (PSS) was used for stress assessment in both genders. Psychologically females were more stressed (24, 20.16%), while males were found to be depressed (25, 21.00%) all shown in Table 4. The association of the psychological elements with BMS also carried a significant relationship (P=0.02).

Table 4: Frequency distribution for Psychological elements (Perceived Stress Scale) and BMS

	Psychological Elements in BMS Patients						P Value
Gender	Stress	Anxiety	Depression	Cancer phobia	Idiopathic	Total	
Male	13 (10.92%)	12(10.08%)	22(21.00%)	5, (4.20%)	12 (10.08%)	67 (56.31%)	
Female	24 (20.16%)	13 (10.92%)	9 (7.56%)	5(4.20%)	1(0.84%)	52(43.69%)	0.02
Total	37(31.09%)	21.00%)	13226.05%)	10 (8.40%)	510.92%)	119(100%)	

DISCUSSION

Burning mouth syndrome is a condition that lacks universally accepted diagnostic criteria, any accurate epidemiological data, prevalence, and poor prognosis due to challenging management. The objective of this study was also to reveal the fact and figures that governed this clinical state and to emphasize upon gender predilection in the presentation of the BMS.

The prevalence of BMS in different literature was found to be 0.6-15% among both genders.[3] The findings of Heir et al.[1] and Aravindhan et al.[17] were also in accordance with the above findings. But the study of De et al.[8] and Renton[16] has even shown that the occurrence of BMS was more in females than males. A study by Grushka[18] has claimed, it seemed the prevalence increases with age in both genders but with significant female predilection and a ratio of 3:1 to 16:1. The present study was unique in this regard in that the findings were opposite to the above findings. The male ratio has suffered BMS more than females. This fact can be described in the light of regional differences, growing stresses, lack of appropriate treatment protocol and follow-ups, growing poverty, lack of education etc.

A study of Grushka[18] has found, the prevalence of BMS increases with age. Even the findings in the study of Aravindhan[17] also showed that the occurrence of BMS was rare in patients under 30 years and never reported in children and adolescents. Heir and colleagues also determined, this chronic condition predominantly affects middle-aged women in the pre-and post-menopausal period, though the males can also be affected with female to male ratio of 7:1. In this study the findings correlate with the above studies but agrees more with the findings of Grushka. The male-to-female ratio in this study clearly showed that the occurrence of this condition affects both genders with advancing age. In addition, the study of Popa[15] also determined that BMS particularly affects post-menopausal women. According to Kia et al.[19], BMS is more common in middle-aged and elderly females, which is in line with the findings of our study. The study by Cao[20] and colleagues has proven that the discomfort was site-specific, and onset was spontaneous that gradually increased in intensity. In contrast to the findings in Grushka[18] patients usually report no pain or burning sensation present at its lowest intensity upon awakening, starting after a meal of the day. Once initiated, it is continuous and reaches a maximum intensity by late evening. It never disturbs sleep. In this study, the BMS presented with a burning sensation and the onset of discomfort was slow, often continuous in nature and site-specific.

These findings were somehow found to be like Grushka.[18] Popa and collaegues[15] have proven that BMS is site specific especially the edge and top of the tongue. Gurvits et al.[21] reports that BMS presents as a burning, scalding perception often high to severe intensity, commonly bilateral and involves the tongue, palate and lower lip. In the present study, the pain was also site-specific especially involving the tongue and buccal mucosa, which agreed well with all the above studies. Nevertheless, Popa[15] claimed that half of the patients with BMS presented with pain of sudden onset and half were complaining the pain of continuous character.

In the study of Grushka in 2000 and 2002 along with his colleagues[22] have observed, that patients with BMS also reported associated symptoms such as alteration in taste (Dysgeusia) and oral dryness (xerostomia). The findings in the present study have revealed that both genders manifested the burning sensation with altered taste and oral somatosensory perception, which correlated well with both above studies. In fact, this study also showed the fissured tongue to be strongly associated with BMS in both genders. The study of Lopez[7] reported similar findings and claimed that BMS has affected the quality of life of patients due to associated symptoms. Popa along with colleagues[15] again have shown that local factors in which 35.6% of patients with candidiasis had BMS followed by denture wearers. Allergy with epoxy resin and methyl methacrylate and 6.8% parafunctional habits (rubbing, rolling, and rotation) or clenching/bruxism have caused BMS of the oral mucosa. All these interesting facts were found to be significantly associated as risk factors with BMS in this present study. Renton[16] was able to show that 36-60% of BMS patients had xerostomia. He described anxiety and depression that increased the chances of xerostomia. In this study, data correlated well with all the above findings. Both genders have shown the association of more than one lesion found

to be the cause of BMS.

Lamaster and colleagues[23] stressed upon taking a proper medical history and review of systems for the conditions like diabetes, anaemia, thyroid disease, pre or post-menopausal status, drug history etc. as all these have direct and indirect effects to potentiate the BMS. Popa[15] was able to find 70.3% of patients, displaying the presence of two or more concomitant factors to be associated with BMS. Post-menopausal women and diabetes in men were important etiological factors in the genesis of BMS, which are in accordance with the findings in this study. The relationship between the medical history and BMS was found to be significant. However, in this study, post-menopausal status and diabetes were predominant risk factors found in females with BMS. These findings were comparable to the findings in the literature, as BMS is more prevalent in females than males due to more distribution of systemic and local risk factors. According to Thoppay,[5] anemia was found in 11.4% of cases having BMS. It has affected both genders and resulted in depapillation of the tongue, which was found to be the specific site for BMS. The present study, astonishingly have shown the same result. Anaemia was found to be associated in patients with BMS.

The extensive research of Lamay[6] and De[8] have proven that the chronicity of this condition is depicted in irritability, stress, anxiety, and depression. It severely affects the quality of life and the patient's social interaction. Thus, it was able to highlight that BMS is a benign condition but yet difficult to manage due to chronic episodes of irritation.[3]All these findings were coherent with the present study. Both genders have shown the different levels of stress and depression that were associated with a burning sensation in the mouth. Popa has even claimed in his study that psychiatric disorders were even high than that found in the literature with BMS, as most cases are still hidden or undiagnosed.

CONCLUSION

The predominant age group for the presentation of BMS between both genders were 51-60 years.

The local and systemic risk factors were found to have a statistically significant relationship with the BMS. Among females, the most common local factor was candidiasis followed by xerostomia. The predisposing systemic factor in women was post-menopausal status. Among males, the most common local factor was also the same, but an association of more than one local factor were found to be involved in the genesis of the BMS. The most prevalent systemic factors in males were diabetes. The psychological element in the progression of BMS was found to be more obvious in both genders.

CONFLICT OF INTEREST

None to declare

REFERENCES

1. Aptton LL, Segel MA, Benoliel R, De laat A. Managemnt of burning mouth syndrome: Systemic review and management recommnendations. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2007;103: 1-13 *https://doi.org/10.1016/j.tripleo.2006.11.009*

2. Aravindhan R, Kumar MS, Satheesh C, Murali A, Prasad S. BMS: A review on its diagnostics and therapeutic approach. J Pharm Bioallied Sci. 2014;6:21-5 *https://doi.org/10.4103/0975-7406.137255*

3. Bergdahl M, Bergdhal J.Burning mouth syndrome: Prevelence and associated factors. J Oral Pathol Med. 2009; 28:350-4 *https://doi.org/10.1111/j.1600-0714.1999.tb02052.x*

4. Borelli V, Marchioli A, Di Taranto R, Romano M, Chiandussi S, Lenarda R et al. Neuropeptides in saliva of subjects with burning mouth syndrome. A Pilot Study. Oral Dis. 2010;16:365-74 *https://doi.org/10.1111/j.1601-0825.2009.01648.x*

5. Cao Y, Zhao Fl, Koli T, Hively R. GABA expression in mammalian taste bud function as a route of inhibitory cell-cell communication. Proc Natl Acad Sci USA. 2009;106:4006-11 *https://doi.org/10.1073/pnas.0808672106*

6. De FT, Teixeira AL, Amaral TM, Dos TP, Abreu MH, Silva Ta et al. Psychiatric Disorders in burning mouth syndrome. J Psychosom res. 2012;72:142-6 *https://doi.org/10.1016/j.jpsychores.2011.11.008*

7. Gao S, Wang Y, Wang Z. Assessment of the trigeminal somatosensory evoked potentials stimulations in patients with burning mouth syndrome. Chin J Dent Res. 2003;3:40-6

8. Grushka M, Bartoshuk L. BMS and oral dysesthesias. Can J Diagn. 2000:99-109

9. Grushka M, Epstein JB, Grosky M. BMS. Am Fam Physician. 2002;57:497-512

10. Grushka M. Clinical features of BMS. Oral Surg Oral Med Oral Pathol. 1999;63:30-6 *https://doi.org/10.1016/0030-4220(87)90336-7*

11. Gurvits GE, Tan A. Burning Mouth Syndrome. World J of Gastroenterology. 2013;7: 665-72 *https://doi.org/10.3748/wjg.v19.i5.665*

12. Heckmann SM , Kirchner E, Grushka M, Wichmann MG, Hummel T. A double -blinded study on Clonazepam in patients with burning mouth syndrome. Laryngoscope. 2012;122:813-6 *https://doi.org/10.1002/lary.22490*

13. Heir NC, Zagury GJ, Thomas D, Ananthan. Burning mouth

syndrome: Current Concept. J Indian Prothodont Soc. 2015;15:300-07
https://doi.org/10.4103/0972-4052.171823

14. Jaaskelanian SK, Rinne JO, Forsell H, Tenovuo O, Kaasnian V, Sonnien P et al. Role of the dopaminergic system in chronic pain. A fluorodopa -PET Study. Pain. 2009; 90:257-60
https://doi.org/10.1016/S0304-3959(00)00409-7

15. Kia et al. BMS and its related risk factors in females. Avicenna J Dent Res. 2017;1:1-3

16. Lamey PJ, Freeman R, Eddie SA, Pankhuest C, Rees T. Vulnerability and presenting symptoms in burning mouth syndrome. Oral Surg Oral Med Oral Pathol, Oran Radiol Endod. 2005;99:48-54
*https://doi.org/10.1016/j.tripleo.2004.01.02*1

17. Lamster IB, Bruno M, Touger R. Mobley C, Epstein JB. Nutrition and oral medicine. 2nd ed. New York: Humana Press; 2014: pp 206-7

18. Lopez P. Camacho F, Lucero M. Quality of life in patient with burning mouth syndrome. J Oral Pathol Med. 2008; 37:389-94
https://doi.org/10.1111/j.1600-0714.2008.00672.x

19. Popa C, Stelae C, Popescu E. Risk factors of burning mouth syndrome: An update. 2011;3:58-66

20. Renton T. Burning mouth syndrome. Rev Pain. 2011;5:12-7
https://doi.org/10.1177/204946371100500403

21. Rodriguez E, Lopez J.Evaluation of the respone to treatment and clinical evaluation in patients of burning mouth syndrome. Med Oral Pathol Oral Cir Buccal. 2013;18:403-10
https://doi.org/10.4317/medoral.18142

22. Thoppay J, rossi S, Ciarroca K. Burning mouth syndrome. Dent Clin Am. 2013;57:497-512
https://doi.org/10.1016/j.cden.2013.04.010

23. Ueda N, Kodama Y, Hori H, Umene W, Sugita A, Nakano H et al. two cases of burning mouth syndrome treated with olanazepine. Psychiatry Clin Neurosci . 2008;62:359-61
https://doi.org/10.1111/j.1440-1819.2008.01806.x

24. Zakrzewska JM, Forssell H, Glenny AM. Intervevntion for the treament of burning mouth syndrome.Cochrane Database Syst Rev. 2005;25:1-24
https://doi.org/10.1002/14651858.CD002779.pub2