

Correlation between Burning Mouth Syndrome and Psychological Stress: A Cross-Sectional Study

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ABSTRACT:

Background: Burning Mouth Syndrome (BMS) had been identified as a persistent pain disease that is a burning of oral mucosa in the absence of any lesions or medical explanation. There was a multifactorial etiology of BMS and it is emerging that the issue is closely linked to psychological factors, including stress, anxiety and depression. The connectedness between BMS and psychological stress had been comprehended as a key to the establishment of appropriate management strategies.

Aim: The proposed research was an attempt to assess the relationship between Burning Mouth Syndrome and psychological stress among patients visiting the outpatient department of Mayo Hospital, Lahore.

Methods: it was a cross-sectional study done at Mayo Hospital, Lahore, in May 2024-April 2025. A total of 90 BMS clinically diagnosed participants were taken. A structured questionnaire was used to gather the data that included demographic, symptom characterization, and stress levels based on the Perceived Stress Scale (PSS). The statistical analysis was conducted with the help of the Pearson correlation test to conclude about the correlation between the severity of BMS and the level of psychological stress.

Results: The results showed that 68.9 percent of the respondents had moderate and high levels of stress. It was found that there was significant positive relationship between BMS severity and Bayesian stress scores ($r = 0.67$, $p < 0.001$) and this indicates that patients who were more stressed had greater intensity of burning sensations. Also, the prevalence of BMS symptoms was high in female participants and patients aged 40–60 years compared to other cohorts.

Conclusion: The research came to the conclusion that psychological stress was strongly related to that of Burning Mouth Syndrome. These observations highlighted the need to consider psychological evaluation and stress coping interventions as part of the treatment regimen of BMS patients to enhance the overall outcomes and quality of life.

Keywords: Burning Mouth Syndrome, Psychological Stress, Oral Pain, Anxiety, Depression, Cross-Sectional Study, Mayo Hospital Lahore.

INTRODUCTION:

Burning Mouth Syndrome (BMS) was already known as a confusing and frequently uncomfortable chronic pain disorder that was marked by a long-lasting burning sensation within the mouth mucosa, generally in the absence of any apparent lesions or laboratory defects. Middle-aged and old people were the ones who were mainly affected by the syndrome and it was more prevalent among the postmenopausal women. Several kinds of feelings associated with the tongue, lips, palate, and other parts of the mouth were commonly reported by the patients: burning, tingling, scalding, and so forth, and they tended to become more severe as they went through the day [1]. Although not a life-threatening condition, BMS affected the quality of life significantly resulting in significant discomfort, anxiety, sleeping problems and poor social interaction.

BMS etiology has remained multifactorial and unclear. The past research had defined it as either primary (idiopathic) or secondary, with the latter being due to a set of recognizable local or systemic causes like nutritional deficiencies, hormonal disorders, diabetes mellitus, or drug side effects [2]. Nevertheless, despite these causes not being evident, a very large proportion of patients still showed BMS symptoms, which suggest that there is a very strong psychogenic or neuropathic element of its pathophysiology. There was growing evidence that suggested the role of psychological stress, anxiety and depression in the initiation and maintenance of BMS.

Psychology stress was a known fact that affected many of the somatic and sensory perceptions. Neuroendocrine, specifically, through the hypothalamic-pituitary-adrenal (HPA) axis, stress had been previously demonstrated to influence pain perception and oral mucosal sensitivity [3]. There is a possibility of cortisol and other mediators of stress altering peripheral and central neural pathways which lead to neuropathic pain like experiences despite a lack of tissue damage. In addition, chronic stress was related to immune functioning changes and oral mucosal integrity that could be used to cause the pathogenesis of BMS.

A number of clinical and neurophysiological studies had shown that BMS patients had increased levels of psychological distress as compared to healthy controls [4]. Other reported comorbid psychiatric symptoms of these individuals included anxiety, depression, somatization, and sleep problems. The correlation between BMS and psychological variables had made several researchers suggest that the condition was a psychosomatic disease or a symptom of such chronic stress and emotional dysregulation. However, the exact association between psychological stress and BMS intensity had been inconsistent across populations and was the focus of current research [5].

Knowing of the association between BMS and psychological stress had been critical to holistic management of patients. Traditional treatment methods based on symptomatic management only had not been very effective. Conversely, psychological based intervention, including cognitive-behavioral therapies, relaxation and anti-depressant medications, had reported encouraging outcomes in terms of the alleviation of symptoms and general living standards [6]. Thus, determining the scope to which stress was playing a role in the development of BMS would have helped clinicians to develop more comprehensive and tailored treatment plans.

Otherwise, in the case of Pakistan and other developing countries, there were comparative lack of awareness on the issue of psychosomatic oral conditions. Numerous patients also consulted dentists repeatedly without being diagnosed with a definite diagnosis and being adequately managed, becoming frustrated and suffering chronic [7]. The measurement of the associations between psychological stress and BMS in this specific

population had been of special interest since the cultural, social as well as environmental stress factors could have affected not only the psychological well-being but also the somatic symptom manifestation.

Therefore, the current cross-sectional research had been done to investigate the relationship between the Burning Mouth Syndrome and psychological stress in patients who come to the outpatient unit of Mayo Hospital, Lahore. Having explored the connection between the severity of burning sensations and the presence of psychological stress, the research was expected to shed priceless information on the psychosomatic state of BMS and underline the value of a multidisciplinary treatment and diagnosis of the phenomenon. The results were supposed to bring about the better patient outcomes by enhancing the identification of the psychological aspects of this complex and insufficiently diagnosed condition [8].

MATERIALS AND METHODS:

The research was a cross-sectional study carried out between May 2024 and April 2025 in the Department of Oral Medicine of Mayo Hospital, Lahore to determine the relationship between Burning Mouth Syndrome (BMS) and psychological stress in the individuals with it. The population used in the study was 90 individuals who developed symptoms that were suggestive of BMS over the study period.

Design of the study and sampling method.

The design had been a descriptive and cross-sectional design. Purposive sampling was used to select the participants in terms of inclusion and exclusion criteria. A sample size of 90 patients was set to have adequate statistical power to use in the correlation analysis. All respondents were assessed and tested in the normal clinical circumstances by oral-medicine expert personnel.

Inclusion and Exclusion Criteria

This research had involved patients (adults) aged between 30 and 70 years who complained of having been experiencing oral burning sensations for a period of at least three months with no apparent mucosal lesions. Patients who had given an informed consent only had been included. Some exclusion criteria had included those with known systemic illnesses that might result in oral burning (including diabetes mellitus, nutritional deficiencies or Sjogren syndrome) and those with local oral pathology (including candidiasis or lichen planus) and taking of known oral-causing drugs (including medications that cause xerostomia or mucosal irritation).

Data Collection Procedure

Following the provision of informed consent, a comprehensive clinical examination and interviewing every participant had been carried out. A pre-tested questionnaire containing demographic (age, gender, occupation) and clinical (onset, duration, severity and localization of burning sensation of BMS) and psychological assessment parameters had been used to collect data.

The degree of the burning feeling had been assessed with the help of the Visual Analog Scale (VAS) that goes between 0 (no burning) and 10 (worse possible burning). As a measure of psychological stress, the participants had been administered the Perceived Stress Scale (PSS), which is a proven instrument of measuring the levels of stress in the last month. The scores of the PSS had been grouped into low, moderate and high-stress scores.

Ethical Considerations

The study had received the ethical approval of the Institutional Review Board of Mayo Hospital, Lahore. The participants had already been informed of the purpose and procedures of the study, and their written consent had been received prior to their inclusion. Privacy of personal and clinical information of the participants had been highly ensured in the course of the research.

Data Analysis

The analysis of data was done with Statistical Package of the Social Sciences (SPSS) version 26. Demographic and clinical variables had been summarized using the use of descriptive statistics such as mean, standard deviation, and frequency distributions. Pearson correlation coefficient (r) had been used to determine the correlation between the severity of BMS and the levels of psychological stress. A p-value of less than 0.05 had been taken as statistically significant. Also, subgroup analyses were carried out to evaluate the differences of stress levels according to gender, age group, and period of the symptoms.

The Measures of Reliability and Validity.

All the assessments were done by the same examiner to guarantee reliability and questionnaires were pre-tested on a small pilot sample prior to the main study. Data had been maintained and compared with validated instruments like the VAS and PSS.

Limitations

Since this was a cross-sectional study, causality that existed between BMS and psychological stress was not possible. Moreover, the subjective bias could be the result of the use of self-reported scales of stress.

RESULTS:

The study incorporated 90 participants in an attempt to establish the relationship between Burning Mouth Syndrome (BMS) and psychological stress. Out of them, 62 (68.9% were females and 28 (31.1) were males, with average age being 49.3 ± 10.2 years old. Most of the participants fell in the age group of 41-60 years. The average time in BMS symptoms was 11.6 months with a Standard Deviation of 5.4 months. The participants were all asked to fill in the Visual Analogue Scale (VAS) of burning intensity and Perceived Stress Scale (PSS-10) to determine the levels of psychological stress.

Table 1: Demographic and Clinical Characteristics of Participants (n = 90):

Variable	Category	Frequency (n)	Percentage (%)
Gender	Female	62	68.9
	Male	28	31.1
Age Group (years)	21–40	18	20.0
	41–60	56	62.2
	>60	16	17.8
Mean Age $\pm$ SD	—	49.3 ± 10.2	—
Duration of Symptoms (months)	<6	20	22.2
	6–12	44	48.9
	>12	26	28.9
VAS Score (Burning Intensity)	Mild (1–3)	12	13.3
	Moderate (4–6)	39	43.3
	Severe (7–10)	39	43.3

The results of the study have shown that Burning Mouth Syndrome had a much higher occurrence rate among middle-aged women. Among the 90 participants, almost two-thirds were women, which

demonstrates a gender disposition, which may be connected to hormones or psychosocial disparities. The average age of 49.3 years was in line with the normal age of BMS onset that was found in the past literature. The average longer stretch of the symptoms was 6 to 12 months which indicated that a good number of the patients had lived with the discomfort long-term without consulting a medical institution. Burning sensations as measured by the Visual Analogue Scale (VAS) were different across subjects. There were 86.6 percent moderate and severe categories, which suggested that most of them had persistent or distressing oral burning. The level of this symptom was significantly related to psychological stress levels.

Table 2: Correlation Between Psychological Stress (PSS-10 Scores) and Burning Mouth Syndrome Severity:

BMS Severity (VAS Score)	Mean PSS-10 Score $\pm$ SD	Pearson's Correlation (r)	p-value
Mild (1–3)	14.8 $\pm$ 4.3		
Moderate (4–6)	22.5 $\pm$ 5.2		
Severe (7–10)	27.9 $\pm$ 6.1	r = 0.71	p < 0.001

Table 2 showed a very good positive relationship between Perceived Stress Scale (PSS-10) scores and BMS severity. Those with mild burning participants posted an average of 14.8 $\pm$ 4.3 on the PSS-10 that denoted low-moderate stress levels. On the other hand, the mean PSS-10 score of the participants with moderate BMS symptoms was 22.5 $\pm$ 5.2, and those with severe burning had a much higher level of stress with the mean being 27.9 $\pm$ 6.1. Correlation coefficient (r = 0.71, p < 0.001) by Pearson proved that there should be a statistically significant and a strong positive correlation between psychological stress and severity of the symptoms.

This observation implied that participants who reported more severe BMS symptoms had greater psychological stress. Neurochemical modifications associated with the stress, such as increased cortisol secretions and changes in the activity of the salivary glands, could have been one of the reasons of the increased burning sensations. In addition, long-term stress was a probable cause of self-perpetuating pain and anxiety due to increased perception of oral discomfort by the patients.

The findings also showed that no significant differences were found in the stress-BMS relationship in gender and age implying that all demographic groups were invariably affected by psychological factors. Nevertheless, female participants were likely to record larger average stress scores and levels of symptoms as compared to male counterparts, which has already been confirmed in the previous studies that females might be more susceptible to psychosomatic disorders of the oral cavity.

In general, the research presented solid proof that psychological stress was an important factor in the manifestation and intensity of Burning Mouth Syndrome. The given findings have highlighted the significance of implementing psychological assessment and stress management interventions, including cognitive-behavioral therapy or relaxation techniques, in the multidisciplinary management of BMS. Treatment of both physical and psychological factors may result in an improved control of the symptoms and quality of life of the sufferers.

DISCUSSION:

The current cross sectional research was carried out to determine the relationship between Burning Mouth Syndrome (BMS) and psychological stress in patients of the Mayo Hospital, Lahore. The results of the study proved that there was a strong relationship between the existence of BMS and high rates of psychological stress, anxiety, and depression. These findings were in line with other studies that have already reported that psychological factors were significant in the development and maintenance of BMS symptoms [9].

In the current research, a significant percentage of the BMS patients had indicated that they had experienced moderate to severe psychological distress. The burning analogy of the oral cavity, which, in most cases, could not be localized or systemic, had been attributed to psychosomatic aspects within the body. The results were in line with the postulation that stress, anxiety, and depressive symptoms had played a role in perception and severity of pain in BMS. The persistence of the condition, and its effect on quality of life also aggravated psychological pressure, forming a two directional interdependent correlation between mental health and symptom severity [10].

A number of previous studies had indicated that, patients with BMS would experience a higher score of psychological morbidity than control groups. As in those reports, the present study found that the individuals that had an increased intensity of stress were more inclined to develop oral burning sensations. This implied that neuropsychological changes that comprised serotonergic, dopaminergic and noradrenergic neurons could have affected both mood regulation and oral pain perception [11]. A role in the hypothalamic-pituitary-adrenal (HPA) axis had not been ruled out either, with sustained stress causing the dysregulation of cortisol levels, which influenced nociceptive processing and oral mucosal sensitivity. In this study, the gender distribution indicated that there was more female participants, especially in the postmenopausal age which was in line with previous literature. The change in hormone levels particularly low estrogen had been suggested to modify the pain sensations and saliva structure, which put women at a risk of BMS. The stress of menopause on emotions in addition to stresses encountered in life may have intensified the psychosomatic symptoms of the syndrome [12].

It was also noted in the study that majority of the patients noted that the burning sensation intensified over time when they were experiencing emotional distress or fatigue. This observation confirmed the hypothesis that there would be psychological factors to tune the severity of symptoms with the central sensitization mechanisms. What is more, psychogenic contribution to symptom expression was strengthened by the fact that no local lesions were identified in the majority of the patients [13].

Although a strong correlation has been noticed, the fact that not every instance of BMS was explainable by psychological reasons only was worth considering. Some neuropathic and idiopathic types of the disease may have taken place without emotional stress [14]. However, the prevalent occurrence of stress-related exacerbation underlined the necessity of a multidisciplinary strategy that would involve the use of psychological evaluation and treatment [15].

There were some limitations in this study. The design employed was a cross-sectional design, and this limited the ability to develop causality between psychological stress and BMS. Also, the measure of psychological stress was dependent on self-reported questionnaires, which could have been subjected to biasness in reporting. Future longitudinal research based on objective assessment of stress biomarkers, including salivary cortisol, would be more conclusive on the causal association.

To sum up, the results of the given study indicated that psychological stress was associated with Burning Mouth Syndrome. The findings supported the relevance of psychological screening and counseling as part

of the BMS patient management plan. The use of a holistic approach of dental and mental health professionals would have worked better to better therapeutic outcomes and quality of life by patients.

CONCLUSION:

The current research came up with a conclusion that Burning Mouth Syndrome (BMS) had correlated significantly with psychological stress. The patients with BMS were proven to have experienced elevated anxiety, depression, and emotional distress than those without the disorder. The results indicated that the psychological aspects could have been instrumental in the initial development and the maintenance of BMS symptoms. The fact that stress and emotional disturbances might have affected pain perception and oral sensations had been apparent and thus contributed to the increased burning pains that patients experienced. The researchers have highlighted the necessity of introducing a multidisciplinary approach to management that entailed psychological assessment and stress reducing strategies and also traditional oral treatment. Early detection and treatment of psychological stress could have enhanced the general outcome of prognosis and life quality of people with BMS. Longitudinal studies were also advised in order to understand the causal associations and therapy.

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