

# Pain perception and quality of life in burning mouth syndrome

## Percepção da dor e qualidade de vida na síndrome da boca ardente

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### ABSTRACT

**BACKGROUND AND OBJECTIVES:** Burning mouth syndrome is a dysfunctional state affecting physical, mental and social welfare, often contributing to chronic stress conditions. Despite the lack of objective data, patients experience pain-related discomfort with impact in their daily life. The objective of this study was to assess the impact of burning mouth syndrome on pain perception and quality of life.

**METHODS:** A cross-sectional, observational, case-controlled study was performed on 76 individuals (38 in each group). The groups were sex- and age-matched. The Oral Health Impact Profile (OHIP-14) questionnaire was used to assess any changes in the quality of life. The visual analog scale was used to assess pain impact and intensity, as well as the Pain Catastrophizing Scale (PCS). The effect of sex and other risk factors associated with burning mouth syndrome were also associated.

**RESULTS:** The age of participants was 41 to 85 years. The patients had a negative impact on quality of life with respect to all dimensions of OHIP-14 and PCS domains. Burning mouth syndrome patients complained about moderate (58%) or intense (42%) pain, while the control group participants experienced only mild pain by visual analog scale. The prevalence was predominant in females (a ratio of 3:1), and the most site involved was the tongue. Menopause, hormonal changes, and gastritis were identified as major risk factors.

**CONCLUSION:** Burning mouth syndrome patients had significantly higher PCS and OHIP-14 scores for all domains, indicating an interaction between a higher burden of pain perception

and worse quality of life which should therefore be adequately assessed, characterized and managed.

**Keywords:** Burning mouth syndrome, Pain, Pain perception, Quality of life.

### RESUMO

**JUSTIFICATIVA E OBJETIVOS:** A síndrome de ardência bucal é um estado disfuncional que afeta o bem-estar físico, mental e social, contribuindo para condições de estresse crônico. Apesar da ausência de dados objetivos, os pacientes experimentam desconforto relacionado à dor com impacto na vida diária. O objetivo deste estudo foi avaliar o impacto da síndrome da boca ardente na percepção da dor e na qualidade de vida.

**MÉTODOS:** Foi realizado um estudo transversal, observacional e caso-controle em 76 indivíduos (38 em cada grupo) pareados por sexo e idade. Foram utilizados o questionário *Oral Health Impact Profile* (OHIP-14) para avaliar mudanças na qualidade de vida, a escala analógica visual para o impacto e intensidade da dor e *Pain Catastrophizing Scale* (PCS). Foi avaliado também o efeito do sexo, idade e outros fatores de risco associados à síndrome de ardência bucal.

**RESULTADOS:** A idade dos participantes foi de 41 a 85 anos. A síndrome de ardência bucal teve um impacto negativo na qualidade de vida em todas as dimensões dos domínios OHIP-14 e PCS. Os pacientes se queixaram de dor moderada (58%) ou intensa (42%), enquanto os controles experimentaram apenas dor leve pela escala analógica visual. A prevalência foi predominante no sexo feminino (3:1), e a língua foi o local envolvido mais comum. Menopausa, alterações hormonais e gastrite foram os maiores fatores de risco.

**CONCLUSÃO:** Os pacientes com síndrome de ardência bucal apresentaram escores PCS e OHIP-14 mais altos para todos os domínios, indicando uma interação entre maior carga de percepção da dor e pior qualidade de vida, o que deve ser melhor avaliado, caracterizado e gerenciado.

**Descritores:** Dor, Percepção da dor, Qualidade de vida, Síndrome da boca ardente.

### INTRODUCTION

Burning mouth syndrome (BMS) is often present in individuals with orofacial pain that do not exhibit other symptoms of dental or systemic origin or oral lesions. It manifests as a burning sensation in the mouth and can affect the tongue, lips, or entire mouth. Other symptoms include xerostomia, oral paresthesia, and altered taste and smell. BMS occurs more frequently in women, and its frequency increases with age and after menopause.

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se<sup>1</sup>. The overall prevalence is reported to be 0.5–5% and up to 12–18% in middle-aged, postmenopausal, or elderly women. Some studies have demonstrated a female-based prevalence with a gender ratio (female:male) of 5:1 or 3:1<sup>2-5</sup>. The psychological profile of these patients is often similar, with high levels of stress, anxiety, and depression possibly being the result of chronic pain rather than an etiological factor<sup>5-8</sup>. Neuropathic mechanisms were proposed to cause BMS; this is supported by findings of histology, neurophysiology, brain imaging, and quantitative sensory tests, whereas BMS pathophysiology suggests a combined role of hormonal, neuropathic, and genetic factors. Pain in BMS is often triggered by spicy and acidic food, stress, and fatigue. However, symptomatic relief can be provided by eating dessert jelly, chewing gum, or sucking on dried fruit<sup>9-11</sup>.

BMS is divided into three types based on the frequency of symptom fluctuation and intensity; type I (35%): symptoms present every day, with a delay after waking up or present throughout the day with the intensity increasing in the evening; type II (55%): symptoms present every day, starting immediately after waking up, and usually associated with psychological disorders; type III (10%): symptoms are rare and confined to unusual regions, such as the neck, and are commonly due to allergic reactions or local factors<sup>12,13</sup>.

Differential diagnosis often requires assessment for lichen planus, candidiasis, hormonal disorders, gastroesophageal reflux, psychosocial stress, nutritional or vitamin deficiencies, diabetes, dry mouth, contact allergies, galvanism, parafunctional habits, cranial nerve injuries, and side-effects of drugs<sup>1,14</sup>. Further complementary exams include blood tests to evaluate thyroid stimulating hormone (TSH), free thyroxine (T4), iron, ferritin, transferrin, 25 hydroxyvitamin D, vitamins B2, B6, B1, and B12, zinc, folic acid, fasting glycemia, lingual nerve block with lidocaine, salivary flow measurements, evaluation of taste function, microbiological swabs (bacteria, viruses, or fungi), and glycosylated hemoglobin for diabetics as well as rheumatological and autoimmune tests in cases of suspected autoimmune disease<sup>8,10</sup>. Additionally, quantitative sensorial tests, functional magnetic resonance imaging, positron emission tomography, and tests for validated salivary biomarkers such as alpha-enolase, interleukin-18, and kallikrein-13 are also performed<sup>15</sup>.

As a differential diagnosis is necessary, few dentists are qualified to assess this syndrome, and thus the greatest difficulty experienced by BMS patients is the lack of an accurate diagnosis. This leads many patients to report oncophobia, loss of taste, difficulty in eating, and emotional problems, as there is a need for more good quality data for both professionals and patients. This study aimed to assess whether the intensity of BMS changes the quality of life using instruments such as the visual analog scale (VAS), pain catastrophizing scale (PCS), and oral health impact profile (OHIP-14) questionnaire, as well as to assess the risk factors involved, such as gender and age.

## METHODS

An observational, cross-sectional, case-controlled study to evaluate the impact of BMS on oral health-related quality of

life and pain perception using the OHIP-14 questionnaire, PCS, and VAS. The sample size was composed of 76 individuals with 38 age- and gender-matched individuals per group and was based on the study<sup>16</sup> with 60 patients. Most studies are unlikely to have a larger sample size except for multicenter studies<sup>16,17</sup>.

The study was carried out in the Clinic of Stomatology of Faculdade de Odontologia de São Leopoldo Mandic, Clinic of Stomatology of Associação de Cirurgiões Dentistas de Campinas and on the Screening Clinic of São Leopoldo Mandic for the control group.

Male and female individuals aged over 18 years old, who had daily untreated burning mouth symptoms for at least 3 months were included. The exclusion criteria were symptoms of dental or systemic origin, lesions in the mouth, and unwillingness to sign the Free and Informed Consent Term (FICT). The control group consisted of individuals who arrived at the screening clinic with or without injury in the mouth, without a BMS history, who signed the FICT, and could be matched by age group.

Patient data was collected, including age, gender, menopause status, OHIP-14, PCS, VAS, drugs used, site, pain duration, and previous illnesses.

The study was approved by the Faculdade de Odontologia de São Leopoldo Mandic ethics committee under No. 1,795,967.

## Statistical analysis

The Statistical Package for Social Sciences (SPSS version 25.0) was used for data analysis. A value of  $p < 0.05$  indicated statistical significance. Comparisons between groups were performed using Chi-square tests for categorical variables and Mann-Whitney U tests for numerical variables.

## RESULTS

Comparisons between individuals of both groups were performed for categorical variables (using a Chi-Square test) according to gender, menopause status, diabetes, hypertension, gastritis, cholesterol, and antidepressant and benzodiazepine usage (Table 1).

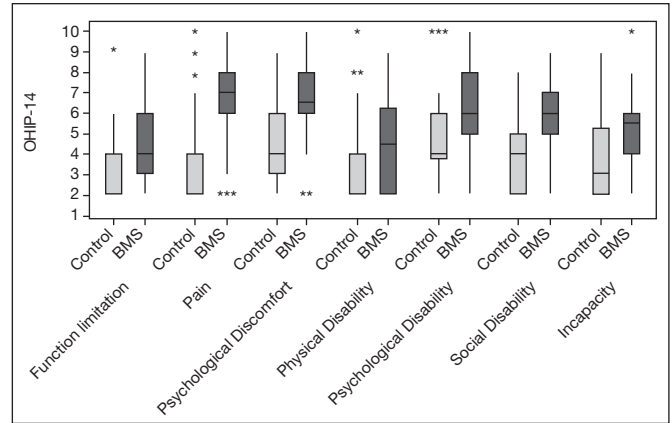
The most common site in BMS patients was the tongue (73.7%), followed by the palate and whole mouth (23.7%), lips (13.2%), oral mucosa (10.5%), alveolar ridge (5.3%), and throat (5.2%) (Figure 1).

The OHIP-14 questionnaire evaluated the impact of oral health on quality of life focusing on social, psychological, and physical dimensions. The questionnaire consisted of 14 questions assessing the following seven dimensions: functional limitation (speech and taste), pain (feeling of pain), psychological discomfort (worry and stress), physical disability (feeding impairment), psychological disability (difficulty in relaxing and shame), social disability (irritation and daily activities), and incapacity (inability to perform daily activities) (Figure 2)<sup>18,19</sup>.

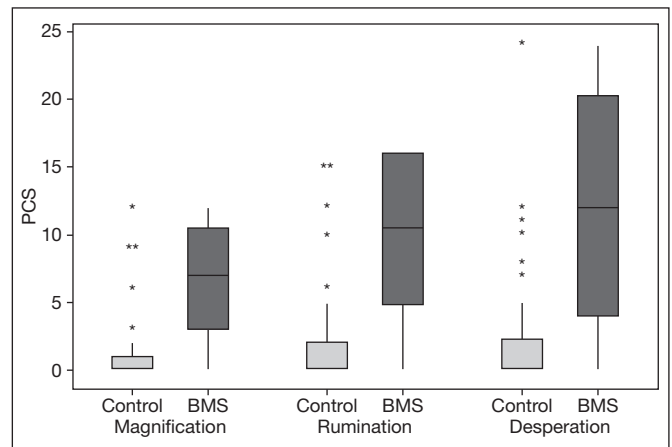
The PCS contained 13 subscales that assessed the degree of thinking or feeling regarding pain and was used to demonstrate daily impact in three domains: magnification (enlargement), rumination (persistent reflection), and desperation (hopelessness). The VAS and PCS were used to assess pain intensity and interference with mood in all patients, with scores from 0 (indicating no pain/burning) to 10 (the worst possible pain/burning) (Figures 3 and 4, Table 2)<sup>20,21</sup>.

**Table 1.** Comparison between the groups for the categorical variables (Chi-Square test)

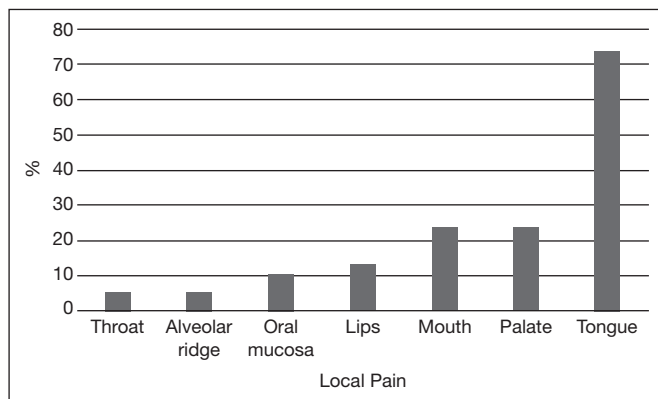
Variables	Category	Control		Burning mouth syndrome		p-value
		n	%	n	%	
Gender	F	29	76.32	30	78.95	0.7831
	M	9	23.68	8	21.05	
Menopause	N	5	17.24	2	6.67	0.2092
	Yes	24	82.76	28	93.33	
Diabetes	N	29	76.32	27	71.05	0.6024
	Yes	9	23.68	11	28.95	
Hypertension	N	30	78.95	19	50.00	0.0084
	Yes	8	21.05	19	50.00	
Gastritis	N	35	92.11	23	60.53	0.0012
	Yes	3	7.89	15	39.47	
Cholesterol	N	37	97.37	29	76.32	0.0066
	Yes	1	2.63	9	23.68	
Antidepressant	N	32	84.21	26	68.42	0.1055
	Yes	6	15.79	12	31.58	
Benzodiazepine	N	35	92.11	28	73.68	0.0330
	Yes	3	7.89	10	26.32	



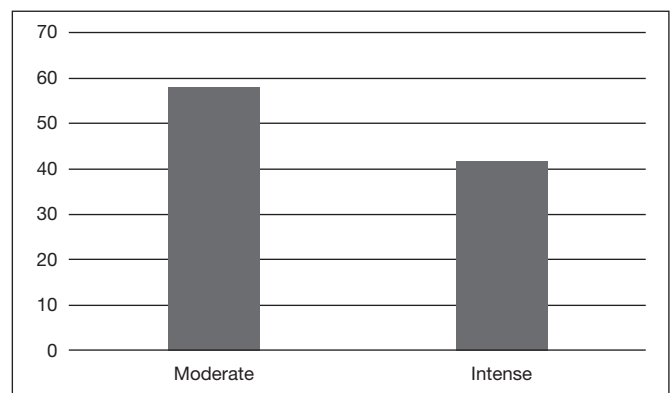
**Figure 2.** Oral Health Impact Profile-14 domains per group



**Figure 3.** Pain Catastrophizing Scale domains per group



**Figure 1.** Site of pain of burning mouth syndrome patients



**Figure 4.** Frequency of intensity of pain perception in the burning mouth syndrome group (Moderate: 3 to 7; Intense: 8 to 10) VAS = visual analog scale.

**Table 2.** Comparison between the groups for the visual analog scale (Mann-Whitney test)

Groups	Scale	n	Mean	Standard Deviation	Minimum	Median	Maximum	p-value
Control	VAS 0 a 10	38	2.08	2.88	0.00	0.00	10.00	<0.0001
BMS	VAS 0 a 10	38	6.64	1.85	3.00	6.30	10.00	

VAS = visual analog scale from zero to 10; BMS = burning mouth syndrome.

## DISCUSSION

The mean age of the population was similar to those in other studies<sup>16,17,22-24</sup>. Comorbidities such as hypertension, gastritis, high cholesterol, and benzodiazepine use were significantly more frequent in the BMS group (Table 1), consistent with previous findings<sup>3,23,25-27</sup>. No significant differences were found between groups regarding diabetes, depression, and psychiatric disorders, which is in contrast with the findings of study<sup>22</sup>, which found comorbidities such as diabetes, hypothyroidism, depression, and anxiety present with BMS<sup>27</sup>. Studies have shown that patients with BMS may have psychiatric and anxiety disorders<sup>3,25</sup>. The prevalence of BMS was higher in females (78.9%) and after menopause (93.3%); however, no significant differences were observed between the age-matched groups. Additionally, hormonal changes and gastritis were important risk factors (Table 1). This is consistent with most studies, such as The International Classification of Headache Disorders (2013), which mentions the tip of the tongue as the most frequent site<sup>9</sup>.

All the domains of both OHIP-14 and PCS were significantly different in the BMS group compared with the control group, indicating a negative impact on the patients' quality of life (Figures 2 and 3). Authors<sup>17</sup> also demonstrated a significant difference in OHIP-14 and PCS<sup>17</sup>. The mean value of pain perception in BMS patients, as evaluated by the VAS, was 6.64; patients exhibited moderate (58%) and intense (42%) pain perception, with no patient showing mild pain. In the control group, the highest value recorded was 4. Furthermore, the VAS scores increased in the BMS group (Figure 4 and Table 2). New longitudinal studies on BMS are required, since in this study it was observed that individuals who complained of burning mouth had already sought out several dentists who were unable to diagnose the syndrome. As a result, these patients undergo anxiety due to the absence of a correct diagnosis. Therefore, studies addressing BMS are crucial, as it seems that BMS is not rare, but underdiagnosed, and can be confused with an allergy due to methylparaben (found in toothpaste), resins, certain types of food, or even by injuries such as candidiasis, lichen planus, gastroesophageal reflux, gastritis, diabetes, thyroid disorder, and vitamin deficiencies. In addition, these individuals reported that the triggers to these burning symptoms included loss of taste, emotional triggers, and seeking psychological/psychiatric treatment due to anxiety and depression. It is important to emphasize that very detailed anamnesis and specific tests are needed for differential diagnoses of BMS. It should also be noted that BMS originates from a peripherally or centrally acting neuropathy, therefore requiring neurological evaluation. This syndrome as well as temporal mandibular joint and orofacial pain are highly complex, and a transdisciplinary approach is necessary for their management.

## CONCLUSION

The present study has demonstrated that BMS patients had significantly higher PCS and OHIP-14 scores for all domains. This indicates an interaction between a higher burden of pain perception and decreased quality of life, which should be adequately assessed, characterized, and managed.

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