

**Keywords**

Burning Mouth Syndrome, Prosthetic rehabilitation, Prosthodontics, Oral sensory symptoms, Occlusion, Patient-reported outcomes, Restorative dentistry

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# Clinical Evaluation of Burning Mouth Syndrome in Patients Undergoing Complex Prosthetic Rehabilitation

**Abstract**

Complex prosthetic rehabilitation can alter oral sensory perception and influence functional outcomes, presenting specific clinical challenges for prosthodontic practice. Burning Mouth Syndrome is a chronic oral sensory condition that may complicate prosthodontic treatment outcomes and patient adaptation. Evidence addressing its clinical presentation within the context of complex prosthetic rehabilitation remains limited. This study aimed to clinically evaluate the occurrence, anatomical distribution, and functional impact of Burning Mouth Syndrome in patients undergoing complex prosthetic rehabilitation and to assess its association with key prosthodontic parameters. A prospective observational clinical investigation was conducted among adult patients receiving complex fixed, removable, or combined prosthetic rehabilitation. Patients were clinically assessed for the presence, location, and severity of burning sensations affecting the oral cavity. Prosthetic rehabilitation parameters, including prosthesis type, arch involvement, occlusal scheme, and post-insertion adaptation, were documented. Patient-reported outcome measures were used to evaluate functional interference with mastication and speech. Clinical and patient-reported data were collected at baseline and during scheduled follow-up visits and analysed using descriptive and inferential statistical approaches. Burning Mouth Syndrome was frequently observed among patients undergoing complex prosthetic rehabilitation, with the tongue identified as the most commonly affected site. Partial edentulism and multi-arch rehabilitation predominated within the study population. Removable and combined prostheses were commonly employed, and post-insertion adjustments were frequently required. Burning symptoms demonstrated a measurable functional impact, particularly on mastication, while prosthesis satisfaction remained high in most patients. Burning Mouth Syndrome represented a clinically relevant finding in prosthodontic patients and influenced both sensory perception and functional performance during rehabilitation. Early identification of burning symptoms, careful prosthetic planning, and structured follow-up may improve patient comfort and optimise outcomes in prosthodontic practice.

**Introduction**

Burning Mouth Syndrome (BMS) is a chronic oral pain syndrome that is characterised by a chronic burning sensation of clinically normal oral mucosa, most commonly of the tongue, lips, and palate.<sup>1</sup> The disorder is multifactorial in its aetiology, which includes peripheral neuropathic dysfunction, changes in central pain modulation, endocrine imbalance, nutritional deficiencies, psychological stressors, and systemic comorbidities.<sup>2</sup> Modern literature distinguishes between primary (idiopathic) BMS and secondary ones that can be linked to some local or systemic causes, such as dental procedures, prosthetic substances, metabolic issues, and salivary changes.<sup>3</sup> The diagnostic complexity is a characteristic of BMS as it lacks any visible mucosal pathology, and the symptoms overlap those of other orofacial pain conditions.<sup>4</sup> Recent progress in neurobiological studies indicates the disturbed small fibre function and dysfunctional sensory pathways that support the neuropathic origin of the

condition. Within prosthodontic practice, Burning Mouth Syndrome is frequently encountered in patients undergoing complex restorative and prosthetic rehabilitation. Changes in occlusion, prosthesis design, material selection, and oral sensory adaptation during rehabilitation can contribute to the onset or persistence of burning symptoms.

Complicated prosthetic rehabilitation brings about significant biomechanical, neuromuscular, and sensory alterations in the mouth.<sup>5</sup> Change in occlusal vertical dimension, base extension of denture, makeup of prosthetic material and distribution of mucosal load impact on oral tactile perception and neurosensory.<sup>6</sup> Oral somatosensory thresholds and adaptation strategies have also been linked to edentulism and edentulism rehabilitation, especially in high-risk groups of patients.<sup>7</sup> Sensory disturbances caused by fixed and removable prostheses may alter salivary dynamics, thermal perception, and mucosal patterns of contact, adding to the burning symptoms simulated or amplified.<sup>8</sup> The form of intolerance or hypersensitivity to dental materials is another issue that will cause pain without any apparent inflammation.<sup>9</sup> These changes in sensations highlight the significance of careful planning and follow-up of the patients with oral burning sensations during or after rehabilitation.

The relationship between prosthodontic procedures and BMS is a field that continues to attract clinical attention.<sup>10</sup> Dental procedures, especially extensive rehabilitative procedures, have also been suggested to be causative or sustaining factors in BMS due to mechanical irritation, occlusal disharmony or stress-mediated neurogenic processes.<sup>11</sup> The study shows that prosthetic variables like poor fit, occlusal instability and material structure could be causing or contributing factors to orofacial pain syndromes in partially or totally edentulous people.<sup>12</sup> Also, the secondary BMS can be predisposed by systemic conditions, which are often present in the prosthodontic patients, such as diabetes mellitus and autoimmune disorders, which complicate the treatment outcomes.<sup>13</sup> The interdisciplinary nature of the interrelationships between prosthodontics, oral medicine, and pain control highlights the importance of thorough clinical assessment in cases of burning symptoms developing in rehabilitated patients.<sup>14</sup> The knowledge of these interactions is essential in making the difference between the discomfort caused by the prosthesis and the primary neuropathic pain disorders. The importance of BMS is becoming more common as a clinical issue; there is a paucity of data on the clinical manifestation of BMS in patients receiving complex rehabilitation on prosthetic devices.<sup>15</sup> Patients with burning sensations in the post-rehabilitation stages are common conditions that face prosthodontists with diagnostic and treatment dilemmas.<sup>16</sup> The symptoms are misinterpreted, and this may result in superfluous adjustments or replacement of materials to the prosthetic without consideration of the underlying neuropathic or systemic causes.<sup>17</sup> The inability to consider the impacts of prosthodontics might slow down the recovery of symptoms and lead to poor patient satisfaction.<sup>18</sup> An organised clinical assessment that includes symptom characteristics, variables of the prosthetic, and patient-reported outcomes is still needed in order to optimise care.<sup>19</sup> This study aims to clinically assess the Burning Mouth Syndrome in patients

undergoing complex prosthetic rehabilitation, to assess the patterns of the symptoms, and determine the factors that are associated with the syndrome and aid in the evidence-based clinical decision-making in the context of restorative dentistry practice.<sup>20</sup>

The concept of Burning Mouth Syndrome and the notion of prosthetic rehabilitation were extensively investigated as individual clinical phenomena; the direct relationship between the two is underrepresented. The available literature is mainly centred on the etiopathogenesis, diagnostic issues, and single-modality methods of treatment, whereas systematic assessments in the framework of the multidimensional rehabilitation of the prosthesis are very limited. Information on symptom progressions, variables in the design of prosthetic, effects of materials, patient reported outcome in rehabilitation stages is still imprecise and erratic. This dearth of combined clinical evidence restricts the ability to make informed choices and provide holistic management of symptoms, and this is where specific clinical studies are required that can connect the field of prosthodontics and orofacial pain research.

## Objective of the Study

The study aims to clinically evaluate prosthodontic rehabilitation outcomes in patients undergoing complex prosthetic treatment, with specific assessment of the prevalence, severity, and anatomic distribution of Burning Mouth Syndrome and its relationship with prosthodontic variables and patient-reported functional outcomes during and after rehabilitation.

## Methods

### Study Design

It was a prospective observational clinical study with the design of a study among patients who were undergoing complex prosthetic rehabilitation. The design aimed to test the clinical features of Burning Mouth Syndrome in the prevailing prosthodontic care environment. Research was not introduced to experimental interventions and treatment modifications. Both clinical observations and patient-reported data were gathered at baseline and further follow-up visits. The observational model allowed them to evaluate the patterns of symptoms and their correlation with the variables of the practice of prosthetic rehabilitation in the real clinical environment in the prosthodontic context.

### Study Population and Patient Selection

The patients were identified by recruiting them among patients who had walked into a prosthodontic clinic from a tertiary care unit and required complex prosthetic rehabilitation services. They were considered eligible adult patients who needed multi-unit fixed, removable, or combined prosthetic treatment. Patients with obvious oral mucosal pathology, acute infection, oral surgery within a recent time period, or other systemic neurological conditions other than Burning Mouth Syndrome were also excluded. People who are taking

drugs that have been proven to affect the oral sense were also ruled out. To achieve proper characterisation of the study population, baseline demographic, medical history and prosthodontic status were reported.

### Prosthetic Rehabilitation Protocol

The treatment of all prosthetics was based on standardised prosthodontic principles. Clinical examination, diagnostic impressions, occlusal examination, and examination of the vertical dimension were included in the treatment planning. Prostheses were created with dental materials and lab strategies that were regularly accepted. Prostheses were supplied in the form of fixed, removable or implant-supported on the basis of the clinical needs of the individuals. Occlusal re-arrangements were done to provide functional harmony and patient comfort. Post-insertion tests were made to determine retention, stability and adaptation. Prosthetic surgeries were the standard clinical procedure with no protocol changes.

### Clinical Assessment of Burning Mouth Syndrome

A structured assessment protocol was used to conduct a clinical assessment of the Burning Mouth Syndrome. The patients were also tested on the occurrence, localisation, and severity of burning sensations in the oral cavity. The inspection of the oral mucosa was done to ensure the absence of observable pathological alterations. The duration of symptoms, daily fluctuation, and time in relation to the use of the prosthesis were recorded. The prosthetic components were tested on mechanical irritation, occlusal discrepancies and surface irregularities. Burning Mouth Syndrome was identified by clinical observation and elimination of local etiological factors that could be responsible for oral discomfort.

### Patient-Reported Outcome Measures

Subjective level of the symptom severity and functional impact were measured using patient-reported outcomes. The intensity of the burn was assessed using a numerical pain rating scale. Other structured questionnaires measured oral comfort, prosthesis acceptance, and disruption of mastication, speech and daily functions. Symptom progression/resolution was monitored by the collection of data at the baseline and follow-up visits. To limit the inter-examiner variability, all assessments were done by the same clinician. The data of the patients were registered without clinical decision-making to maintain objectivity.

### Follow-Up and Evaluation Timeline

The patients were followed on a standardised schedule of evaluation after the delivery of the prosthesis. Immediately after rehabilitation and when the patient reached the predetermined follow-up, clinical reviews were carried out. Burning symptoms, prosthesis adaptation and oral mucosal status were re-assessed during every visit. Prosthetic adjustments that were necessary to provide comfort and functionality were recorded. The persistent improvement or exacerbation of symptoms was noted over time. The length of the follow-up was standardised among participants so that comparisons of clinical outcomes and temporal trends of symptoms could be made.

### Statistical Analysis

Data collected was tabulated and statistically assessed. Summary statistics included the description of demographic variables, the variables of prosthetics, and the distribution of Burning Mouth Syndrome manifestations. Prosthodontic factors and symptom severity were tested through appropriate inferential statistical techniques based on the data distribution. The longitudinal shifts in patient-reported outcomes were measured using repeated-measures comparisons, where repeated measures were done over intervals of follow-up time. A predetermined level of confidence was determined as the level of statistical significance. This method of analysis focused on clinical relevance and interpretability of results instead of predictive or computational modelling.

## Results

### Demographic and Clinical Characteristics

The analysis population reported slightly more patients of female gender than males. Partial edentulism was the most common clinical case, and a significant percentage of the participants were found to have complete edentulism as depicted in Table 1. The majority of patients said that their edentulism had lasted between 6 and 10 years, indicating a long-term necessity to use the prostheses. A sub-group of the participants was found to have systemic conditions, with diabetes mellitus being the most prevalent type of comorbidity. Most of the patients did not complain of a systemic disease. Almost 50% of the participants presented burning symptoms at baseline, which underscores the clinical implication of Burning Mouth Syndrome to patients with complex prosthetic rehabilitation.

**Table 1. Demographic and Clinical Characteristics of Patients Undergoing Complex Prosthetic Rehabilitation**

Variable	Category	n (%)
Sex	Male	34 (42.5)
	Female	46 (57.5)
Type of edentulism	Partial	49 (61.3)
	Complete	31 (38.7)
Duration of edentulism	≤5 years	29 (36.3)
	6–10 years	34 (42.5)
	>10 years	17 (21.2)
Systemic conditions	Diabetes mellitus	18 (22.5)
	Autoimmune disorders	9 (11.3)

<b>Baseline burning symptoms</b>	None reported	53 (66.2)
	Present	37 (46.3)
	Absent	43 (53.7)

### Prosthetic Rehabilitation Parameters

Prosthetic rehabilitation parameters were analysed to reveal that removable prostheses were the most commonly used, followed by fixed and combined prosthetics. Rehabilitation was typically done on both sides of the mouth, which means that treatment needs are fairly complicated, as demonstrated in Table 2. Balanced occlusion was the most common scheme of occlusion, and mutually guarded occlusion was also

widely used. The most popular category of used materials included metal-ceramic ones; all-ceramic and acrylic-based prostheses were used as well. It was found that half of the rehabilitations needed post-insertion adjustments, which emphasises the necessity of clinical optimisations of the results of the prosthodontic treatment delivery and also reflects the adaptability of the treatment outcomes.

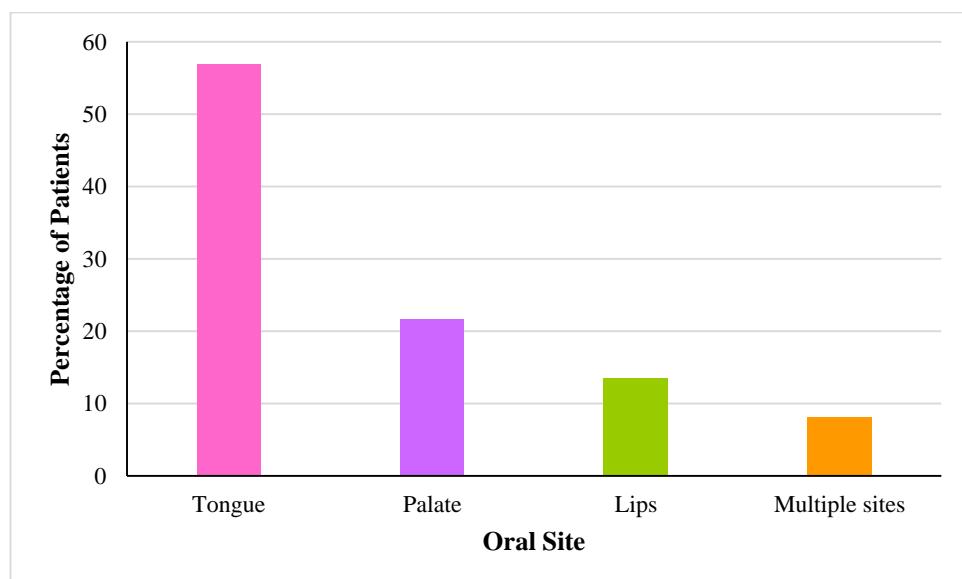
**Table 2. Prosthetic Rehabilitation Parameters and Clinical Adaptation Outcomes**

Prosthetic Variable	Category	n (%)
<b>Type of prosthesis</b>	Fixed prosthesis	28 (35.0)
	Removable prosthesis	32 (40.0)
	Combined prosthesis	20 (25.0)
<b>Arch involvement</b>	Maxillary	21 (26.3)
	Mandibular	17 (21.2)
	Both arches	42 (52.5)
<b>Occlusal scheme</b>	Balanced occlusion	36 (45.0)
	Mutually protected occlusion	29 (36.3)
	Other schemes	15 (18.7)
<b>Prosthetic material category</b>	Metal-ceramic	34 (42.5)
	All-ceramic	26 (32.5)
	Acrylic-based	20 (25.0)
<b>Post-insertion adjustments</b>	Required	39 (48.7)
	Not required	41 (51.3)

### Distribution of Burning Mouth Syndrome by Oral Site

Burning Mouth Syndrome and its anatomical distribution in patients receiving complicated rehabilitation with prosthetics. The most common site of attack was found to be the tongue, then the palate and lips and less common were the multiple oral sites, as revealed in Figure 1. Such a distribution pattern suggested a preference towards those areas that have a

lot of prosthetic contact and an increase in the sensory innervation. The results indicated that the mechanisms of response to prosthetic rehabilitation might manifest as mechanical, functional or neurosensory mechanisms of symptom localisation. The preeminence of tongue involvement raised the significance of exceptional care taken in designing the prosthetics and in assessing the occlusiveness to reduce sensory discomfort during recovery.

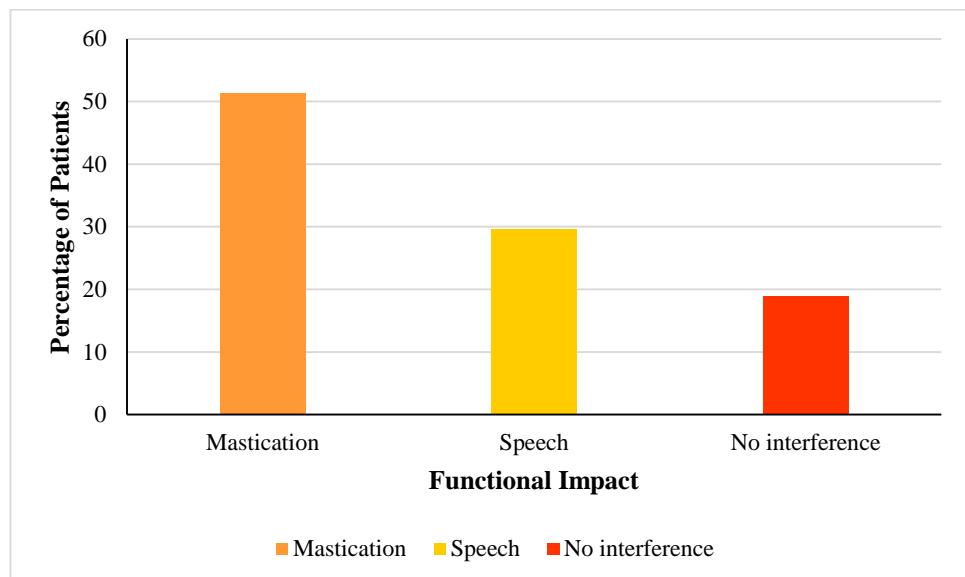


**Figure 1. Distribution of Burning Mouth Syndrome by Oral Site**

### Functional Impact of Burning Mouth Syndrome

The practical effects of the Burning Mouth Syndrome on activities of daily living in the oral cavity on the study population. The most commonly affected one was Mastication, then speech, with a smaller percentage of patients reporting no functional interference, as in the case in Figure 2. Such results confirmed that the effects of burning went beyond sensory pain and affected functional performance during the use of a prosthetic.

The clinical significance of the Burning Mouth Syndrome in the outcomes of the prosthodontic treatment was highlighted by the witnessed effect on the mastication. There were functional limitations; a high number of patients still used a prosthesis, which highlights the importance of specific clinical assessment and symptom treatment in the process of follow-up in the aftermath of rehabilitation.



**Figure 2. Functional Impact of Burning Mouth Syndrome**

### Discussion

This study was an organised clinical assessment of Burning Mouth Syndrome in patients receiving complex rehabilitation with prosthetic devices. It was found that Burning Mouth Syndrome was a common and clinically significant condition in such a population. The demographics analysis indicated that there were more female patients, and the majority were having partial edentulism, as shown in Table 1. Almost 50 % of the participants burned at the time of baseline, indicating that oral sensory disturbances were often accompanied by advanced prosthodontic requirements. Parameters of rehabilitation using prosthetics were quite complex in terms of treatment with multi-arch, and the subsequent requirements of post-insertion adjustments, like Table 2. The joint analysis of the clinical, prosthetic, and patient-reported variables proved the explanation that the Burning Mouth Syndrome affected not only the sensory perception but also the functional performance in the process of rehabilitation.

There are a number of prosthodontic variables that seemed to affect the occurrence and distribution of burning symptoms. Removable prostheses and combined designs of prostheses were common, as this indicated more contact with the mucosa and transmission of loads. The fact that the tongue was most affected points to the possibility that prosthetic components can have changed oral biomechanics or sensory feedback in highly innervated areas. Balanced occlusion was widespread, but the fact that it had to be readjusted significantly after insertion suggested that there was still a problem of adaptation. These results

suggested that the important factors in symptom modulation were the occlusal refinement, the choice of material and the fit of the prostheses. The impairment of the functional effects on mastication of Figure 2 also made it more pronounced that burning symptoms were not the singular sensory problem, but affected the work of the prostheses and patient comfort.

The demographic trend of this study matched earlier reports that have indicated a prevalence of greater burning oral symptoms in the female patient and the patient with partial edentulism.<sup>21</sup> Previous studies also revealed the tongue to be the most affected location, which is a finding that corroborates the anatomic distribution.<sup>22</sup> The correlation between systemic disorders, especially diabetes mellitus, and the burning symptoms, with the previous results that correlated metabolic disorders with the distortion of oral sensory perception.<sup>23</sup> The presence of functional interference with mastication and speech, with previous literature in the prosthodontic and oral medicine study, where chewing difficulty was noted to be a common complaint among patients with the condition of Burning Mouth Syndrome.<sup>24</sup> The past research postulated that dental procedures and tooth replacement rehabilitation can also be a stimulating or a sustaining factor with mechanical or neurosensory processes, which in the research was confirmed by the synaptic symptom onset occurring after the rehabilitation procedure.<sup>25</sup>

Clinically, the results highlighted the significance of a detailed evaluation of patients who are undergoing a complex prosthetic rehabilitation process. Prosthodontists are to be alert to the symptoms of

burning before and after treatment commencement. The need to carry out post-insertion adjustments regularly showed that the ensuing follow-up and proactive symptom surveillance were needed. The integration of patient-reported outcome measures into everyday practice in the field of prosthodontics could simplify the process of early detection of functional disability and early response. The impact of the design on the prosthetic, such as the harmony of the occlusal, the choice of materials used, and the distribution of the mucosa load, seemed especially pertinent in patients who reported having oral burning symptoms. The management of these factors can make patients more comfortable and positively influence the results of rehabilitation in general. These findings have direct implications for prosthodontic planning and restorative dentistry practice.

The findings should be interpreted in light of several inherent study limitations. The observational design did not allow for causal inference among the variables of the prosthetics and Burning Mouth Syndrome. The lack of a control group did not allow direct comparison to non-symptomatic patients who went through the same rehabilitation. Also, patient-reported outcomes presented subjectivity. The limitations were not as strong as the structured approach to the study, and the combination of the clinical and prosthodontic data made the findings more valid. Future studies need to take into account controlled longitudinal designs that would help resolve causal relationships and investigate specific prosthodontics intervention that could be used to alleviate symptoms. Additional neurosensory research and the interdisciplinary management of these patients can also contribute to better clinical outcomes.

## Conclusion

This study provided a focused clinical evaluation of Burning Mouth Syndrome in patients undergoing complex prosthetic rehabilitation within a prosthodontic setting. The findings demonstrated that burning symptoms were prevalent among rehabilitated patients and frequently coexisted with advanced restorative needs. Female predominance, partial edentulism, and prolonged duration of edentulism were common characteristics within the study population. Prosthetic rehabilitation often involved multi-arch treatment, removable or combined prostheses, and required post-insertion adjustments, reflecting clinical complexity. Burning Mouth Syndrome predominantly affected the tongue and exerted a measurable functional impact, particularly on mastication. Despite the presence of sensory and functional symptoms, prosthesis satisfaction remained high, indicating that successful rehabilitation outcomes were achievable even in symptomatic patients when appropriate clinical management was provided. The findings underscored the importance of integrating neurosensory assessment into routine prosthodontic evaluation, particularly in patients undergoing complex rehabilitation. Early identification of burning symptoms, careful occlusal analysis, and meticulous prosthetic design may reduce symptom burden and improve patient comfort.

Extended follow-up and patient-reported outcome monitoring should be considered essential components of post-rehabilitation care. Prosthodontists should adopt a patient-centred, interdisciplinary approach, incorporating systemic health considerations and functional assessment to optimise rehabilitation outcomes. Such strategies align with the scope of restorative dentistry and support evidence-based clinical decision-making in contemporary prosthodontic practice.

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