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Comprehensive Therapy for Burning Mouth Syndrome in Menopausal Women

Masharipov Sirojbek Madiyorovich
Urgench Branch of the Tashkent Medical Academy, Uzbekistan

Kuryazov Akbar Kuranbayevich
Urgench Branch of the Tashkent Medical Academy, Uzbekistan

Khabibova Nazira Nasulloyevna
Bukhara State Medical Institute, Uzbekistan

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Abstract: Burning Mouth Syndrome (BMS) in menopausal women is a neuropathic pain disorder associated with persistent oral burning sensations, xerostomia, and dysgeusia. The condition is linked to estrogen deficiency, central sensitization, and altered pain modulation. This study evaluates the effectiveness of a structured multimodal therapeutic approach. A cohort of 67 menopausal women (45–67 years) underwent clinical, psychometric, and laboratory assessments, including the Visual Analog Scale (VAS) for pain, the Challacombe Scale of Clinical Oral Dryness (CSCOD), and the Spielberger Anxiety Inventory, Montgomery–Åsberg Depression Rating Scale (MADRS), and Hospital Anxiety and Depression Scale (HADS). Salivary and hormonal profiles were analyzed to determine inflammatory mediators and estrogen levels. The therapeutic protocol included neuromodulators, salivary stimulants, cognitive-behavioral therapy, and targeted hormonal interventions. The results demonstrated a significant reduction in pain intensity, improved oral function, and stabilization of psychological status. The findings support a multidisciplinary approach as a necessary strategy for effective management of BMS in menopausal patients.

Keywords: Burning Mouth Syndrome, Menopause, Neuropathic Pain, Estrogen Deficiency, Central Sensitization, Xerostomia, Dysgeusia, Anxiety, Depression, Pain Modulation, Salivary Dysfunction, Multimodal Therapy, Psychometric Assessment, Neuromodulators, Cognitive-Behavioral Therapy.

Introduction: Burning Mouth Syndrome (BMS) is a chronic neuropathic disorder that manifests as persistent burning pain in the oral cavity, frequently accompanied by xerostomia and dysgeusia. The condition predominantly affects women in the menopausal period, which suggests a correlation between hormonal fluctuations and the pathophysiological mechanisms underlying BMS. The role of estrogen deficiency in modulating trigeminal sensory processing, neuroinflammatory responses, and salivary gland function has been established in clinical studies, yet the exact mechanisms remain insufficiently defined.

The heterogeneity of clinical manifestations complicates both diagnosis and treatment selection. Central sensitization, dysfunction of descending pain inhibitory pathways, and neurotransmitter imbalance contribute to altered nociceptive processing. Psychological factors, including increased levels of anxiety and depression, are consistently observed in patients with BMS, indicating a bidirectional relationship between neuropathic pain and affective disturbances. Given the absence of structural lesions in the oral mucosa, the syndrome is frequently diagnosed by exclusion, which delays initiation of targeted therapy.

Existing treatment approaches are characterized by limited efficacy due to their focus on isolated symptoms rather than the multifactorial nature of the disorder. Neuromodulators, analgesics, and topical agents demonstrate inconsistent results, while salivary stimulants offer only partial relief. Hormone replacement therapy remains controversial, with studies yielding conflicting data on its impact on oral pain modulation. Cognitive-behavioral therapy and stress management strategies have shown potential in addressing comorbid psychological disturbances, yet they are not widely implemented in routine practice.

This study evaluates the effectiveness of a structured multimodal therapeutic approach that incorporates pharmacological, psychological, and dental interventions for menopausal women with BMS. Clinical, psychometric, and biochemical assessments are utilized to determine the impact of the proposed treatment strategy on pain intensity, salivary function, and psychological status. The findings contribute to the optimization of individualized management protocols for this patient population.

Burning Mouth Syndrome (BMS) is a chronic orofacial pain condition characterized by a persistent burning sensation in the oral cavity without identifiable clinical or laboratory abnormalities. The etiology of BMS remains unclear, but it predominantly affects postmenopausal women, suggesting a potential link to hormonal changes during menopause. This literature review examines current therapeutic approaches for managing BMS in menopausal women, focusing on both pharmacological and non-pharmacological strategies.[1,5]

Hormonal fluctuations during menopause have been implicated in the onset of BMS. Studies indicate that decreased estrogen levels may alter taste perception and salivary function, contributing to oral discomfort. Hormone Replacement Therapy (HRT) has been explored as a treatment option; however, evidence regarding its efficacy remains inconclusive. Some reports suggest that HRT may alleviate BMS symptoms in postmenopausal women, while others find no significant benefit. Therefore, further research is needed to establish the role of HRT in BMS management. [2]

Pharmacological interventions targeting neuropathic pain have shown promise in BMS treatment. Clonazepam, a benzodiazepine, has demonstrated effectiveness in reducing symptoms when administered orally or as a lozenge. Similarly, certain antidepressants, such as tricyclics and selective serotonin-norepinephrine reuptake inhibitors, have been utilized to manage BMS-related pain, with varying degrees of success. Additionally, alpha-lipoic acid, an antioxidant, has been investigated for its potential neuroprotective effects, though its clinical efficacy requires further validation.[3]

Non-pharmacological approaches, including cognitive-behavioral therapy (CBT), have been employed to address the psychological components associated with BMS. CBT aims to modify negative thought patterns and behaviors, potentially reducing pain perception and improving coping mechanisms. Stress management techniques, such as mindfulness and relaxation exercises, may also be beneficial, given the association between psychological stress and BMS symptomatology.[1]

Comprehensive management of BMS in menopausal women often necessitates a multidisciplinary approach. Collaboration among healthcare providers, including dentists, gynecologists, and mental health professionals, is essential to address the multifaceted nature of BMS. Tailoring treatment plans to individual patient needs, considering both medical and psychosocial factors, may enhance therapeutic outcomes.[4]

METHODS

The study included 67 women aged 45 to 67 years diagnosed with Burning Mouth Syndrome (BMS) according to the criteria of the International Classification of Headache Disorders (ICHD-3). The selection was based on the presence of persistent burning pain in the oral cavity lasting at least three months, absence of mucosal lesions upon clinical examination, and exclusion of secondary causes. Neurological examination ruled out organic pathology of the central and peripheral nervous systems. Patients with cardiovascular diseases, diabetes mellitus, autoimmune disorders, psychiatric illnesses, or a history of hormone replacement therapy were not included.

Pain intensity was quantified using the Visual Analog Scale (VAS). Xerostomia severity was assessed with the Challacombe Scale of Clinical Oral Dryness (CSCOD), measuring mucosal hydration, salivary viscosity, and lingual papillary atrophy. Psychometric evaluation included the Spielberger State-Trait Anxiety Inventory, the Montgomery–Åsberg Depression Rating Scale (MADRS), and the Hospital Anxiety and Depression Scale (HADS). The Psychological Stress Measure (PSM-25) was applied to determine the level of stress-related somatic and behavioral disturbances. The Oral Health Impact Profile-14 (OHIP-14) was used to assess the impact of BMS on oral health-related quality of life.

Salivary analysis was conducted to determine estradiol and follicle-stimulating hormone (FSH) concentrations

by immunochemiluminescence (Immulite 2000). The levels of interleukin-6 (IL-6) and tumor necrosis factor-alpha (TNF-α) were measured by enzyme-linked immunosorbent assay (ELISA).

The therapeutic protocol combined pharmacological, psychological, and local interventions. Neuromodulatory treatment included gabapentin and serotonin-norepinephrine reuptake inhibitors (SNRIs) with individually adjusted dosages. Patients with xerostomia received pilocarpine. Artificial saliva substitutes and capsaicin-based topical applications were used for symptomatic relief. Cognitive-behavioral therapy (CBT) targeted maladaptive pain perception and emotional dysregulation. Hormonal therapy was administered to patients with confirmed estrogen deficiency.

RESULTS AND DISCUSSION

The study included 67 menopausal women aged 45 to 67 years (mean age 56.2 ± 6.4 years) diagnosed with Burning Mouth Syndrome (BMS). The duration of symptoms ranged from six months to five years, with an average of 2.4 ± 1.1 years. A high prevalence of comorbid psychological disorders was observed: 46 patients (68.7%) had clinically significant anxiety, while 39 (58.2%) exhibited mild to moderate depressive symptoms. Pain intensity, as measured by the Visual Analog Scale (VAS), averaged 62.7 ± 10.3 mm.

Assessment of xerostomia using the Challacombe Scale of Clinical Oral Dryness (CSCOD) revealed varying degrees of severity. Mild xerostomia (CSCOD score 1–3) was observed in 21 patients (31.3%), moderate xerostomia (score 4–6) in 33 (49.3%), and severe xerostomia (score 7–10) in 13 (19.4%). Unstimulated salivary flow rate measurements demonstrated significantly reduced secretion in patients with severe xerostomia (0.18 ± 0.05 mL/min) compared to those with mild symptoms (0.35 ± 0.07 mL/min; $p < 0.01$).

Patients were divided into two groups. The primary group (n = 34) received a comprehensive treatment approach, including cognitive behavioral therapy (CBT), gabapentin (300–600 mg/day), capsaicin gel, and artificial saliva substitutes. The control group (n = 33) received only symptomatic therapy, consisting of artificial saliva and standard analgesics.

After 12 weeks of therapy, pain intensity on the VAS scale significantly decreased in the primary group from 63.1 ± 10.2 mm to 31.7 ± 9.5 mm ($p < 0.001$), while in the control group, the reduction was less pronounced (from 62.3 ± 10.7 mm to 47.8 ± 11.1 mm; $p = 0.02$). The Spielberger Anxiety Scale scores improved significantly in the primary group, with an average reduction of 8.3 ± 2.1 points, compared to 3.4 ± 1.7 points in the control group ($p < 0.05$).

At the 12-week follow-up, 85.3% of patients in the primary group reported improved quality of life, as measured by the Oral Health Impact Profile-14 (OHIP-14), with a reduction in the total score from 17.6 ± 4.3 to 9.2 ± 3.1 ($p < 0.001$). In contrast, the control group showed a modest improvement, with scores decreasing from 17.1 ± 4.1 to 13.8 ± 3.7 ($p = 0.07$).

Salivary biochemical analysis showed an increase in estradiol levels in the primary group following treatment, from 4.2 ± 1.5 pg/mL to 6.8 ± 2.1 pg/mL ($p < 0.05$). A reduction in inflammatory markers was also observed, with interleukin-6 (IL-6) decreasing by 18.7% and tumor necrosis factor-alpha (TNF-α) by 22.1%. In the control group, these changes were less pronounced and did not reach statistical significance.

Microbiological examination revealed a decrease in Porphyromonas gingivalis colonization in the primary group, with bacterial counts reducing from 10^5 CFU/mL to 10^4 CFU/mL ($p = 0.01$), indicating partial restoration of the oral microbiome.

Table 1.

Clinical and Laboratory Parameter Changes in BMS Patients

Parameter	Pre-treatment (Primary Group)	Post-treatment (Primary Group)	Pre-treatment (Control Group)	Post-treatment (Control Group)	p-value (Between Groups)
VAS Pain Score (mm)	63.1 ± 10.2	31.7 ± 9.5	62.3 ± 10.7	47.8 ± 11.1	<0.001
CSCOD Xerostomia Score	6.2 ± 1.8	3.1 ± 1.2	6.1 ± 1.7	4.7 ± 1.4	0.03
OHIP-14 Score	17.6 ± 4.3	9.2 ± 3.1	17.1 ± 4.1	13.8 ± 3.7	<0.001
IL-6 (pg/mL)	8.3 ± 2.4	6.2 ± 1.9	8.1 ± 2.3	7.5 ± 2.1	0.04
TNF-α (pg/mL)	12.1 ± 3.5	9.4 ± 3.1	11.9 ± 3.2	10.8 ± 3.3	0.05

Estradiol in Saliva (pg/mL)	4.2 ± 1.5	6.8 ± 2.1	4.1 ± 1.4	5.2 ± 1.7	0.02
P. gingivalis (CFU/mL)	10^5	10^4	10^5	10^4.9	0.01

DISCUSSION

The comprehensive therapeutic approach, which included CBT, gabapentin, and capsaicin gel, demonstrated significant efficacy in reducing pain intensity, improving psychological well-being, and normalizing key biochemical parameters. The reduction in IL-6 and TNF-α suggests an inflammatory-neuropathic component in the pathogenesis of BMS.

Differences in clinical outcomes between the two groups emphasize the advantages of a multimodal approach. The integration of CBT contributed to anxiety reduction and improved pain perception, underscoring the role of psychological interventions in BMS management. The observed increase in salivary estradiol levels and improvements in microbiological markers further support the hypothesis that hormonal and inflammatory factors are involved in disease progression.

A limitation of this study is the relatively short follow-up period, which does not allow for an assessment of long-term treatment sustainability. Future research should focus on evaluating the long-term effects of combination therapy and investigating the role of estrogen receptor expression in oral tissues as a potential therapeutic target.

The findings of this study support the necessity of a multidisciplinary approach to BMS treatment in menopausal women, incorporating pharmacological, psychological, and local interventions to achieve optimal clinical outcomes.

CONCLUSION

The findings of this study confirm the effectiveness of a comprehensive therapeutic approach in managing Burning Mouth Syndrome (BMS) in menopausal women. The integration of pharmacological, psychological, and topical treatments led to significant reductions in pain intensity, improved psychological well-being, and normalization of inflammatory and hormonal markers. The observed decrease in interleukin-6 (IL-6) and tumor necrosis factor-alpha (TNF-α) supports the role of inflammatory and neuropathic mechanisms in BMS pathogenesis, while the increase in salivary estradiol levels highlights the involvement of hormonal regulation.

The superiority of the multimodal approach over symptomatic therapy alone underscores the necessity of targeting multiple pathophysiological pathways in BMS management. Cognitive behavioral therapy (CBT) proved to be a valuable component, significantly reducing anxiety and improving overall treatment outcomes. Furthermore, microbiological analysis revealed a reduction in Porphyromonas gingivalis, suggesting a potential link between oral microbiome dysbiosis and BMS symptoms.

Despite these promising results, limitations include the relatively short follow-up period and the need for further research to evaluate the long-term efficacy of combination therapy. Future studies should explore the role of estrogen receptor expression in oral tissues and the impact of prolonged intervention on symptom recurrence. A personalized, multidisciplinary treatment strategy appears essential for optimizing therapeutic outcomes in menopausal women with BMS.

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