

Menopause and Oral Health: Clinical Implications and Preventive Strategies

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INTRODUCTION

Menopause is a natural biological process marking the end of a woman's reproductive years, typically occurring between the ages of 45 and 55 years.^[1] This phase is characterized by the cessation of menstruation and a significant decline in the production of ovarian hormones, particularly estrogen and progesterone.^[1] These hormonal changes bring about a wide range of physiological and psychological alterations, impacting various aspects of a woman's health, including the oral cavity.^[1] The decline in estrogen levels during menopause has profound implications for oral health, contributing to an increased risk of various dental and

ABSTRACT Menopause, occurring typically between the ages of 45 and 55 years, marks the end of a woman's reproductive years and is characterized by the cessation of menstruation and a significant decline in estrogen and progesterone production. These hormonal changes impact various aspects of health, including oral health. This review explores the clinical implications of menopause on oral health and outlines preventive strategies. Hormonal changes during menopause can lead to xerostomia (dry mouth), periodontal disease, burning mouth syndrome (BMS), oral mucosal changes, altered taste sensation, and osteoporosis-related oral health issues. Xerostomia results from decreased salivary flow, increasing the risk of dental caries and oral infections. Periodontal disease is exacerbated by estrogen deficiency, leading to bone loss and increased tooth mobility. BMS, characterized by a chronic burning sensation, and oral mucosal atrophy are linked to hormonal fluctuations. In addition, altered taste perception and osteoporosis further complicate oral health management. Effective prevention and management strategies include regular dental checkups, good oral hygiene practices, and tailored treatments such as fluoride treatments, saliva substitutes, and hormone replacement therapy. Nonpharmacological approaches such as stress management and lifestyle modifications also play a role. This review emphasizes the importance of a multidisciplinary approach, involving dental and medical professionals, to address the complex oral health challenges faced by menopausal women. Understanding the underlying mechanisms and implementing evidence-based preventive measures can significantly enhance the oral health and overall well-being of menopausal women.

KEYWORDS: *Hormonal changes, menopause, oral health, periodontal disease, xerostomia*

periodontal conditions.^[2] This review aims to explore the clinical implications of menopause on oral health and outline preventive strategies to mitigate these effects.

The oral cavity is a complex and dynamic environment where systemic health significantly influences oral health.^[3] Estrogen receptors are present in the oral mucosa, salivary glands, and periodontal tissues, suggesting that hormonal changes during menopause can directly affect these tissues.^[3] One of the most common oral health

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issues observed in menopausal women is xerostomia or dry mouth. This condition results from a decrease in salivary flow, which can lead to difficulties in speaking, chewing, and swallowing, as well as an increased risk of dental caries and oral infections.^[4,5] Saliva plays a crucial role in maintaining oral health by providing a natural defense mechanism against pathogens, buffering acids, and aiding in the remineralization of tooth enamel. Thus, reduced salivary flow during menopause significantly compromises oral health.^[3,4]

Another significant concern for menopausal women is the heightened risk of periodontal disease. Periodontitis, a chronic inflammatory condition affecting the supporting structures of the teeth, has been linked to hormonal changes.^[6] Estrogen deficiency can lead to a decrease in bone density, affecting the alveolar bone that supports teeth. This makes menopausal women more susceptible to periodontal bone loss, which can result in tooth mobility and eventual tooth loss if left untreated.^[7] Furthermore, hormonal changes can influence the immune response, potentially exacerbating inflammatory processes in the periodontal tissues.^[7]

Menopausal women are also prone to experiencing burning mouth syndrome (BMS), a condition characterized by a chronic burning sensation in the mouth, often without any apparent clinical signs.^[8] The etiology of BMS is multifactorial, but hormonal fluctuations during menopause are believed to play a significant role.^[9] This condition can severely impact the quality of life, leading to discomfort, altered taste sensations, and psychological distress.^[10-14]

The decline in estrogen levels during menopause can also affect the oral mucosa, leading to thinning and atrophy.^[15] This makes the mucosal tissues more susceptible to trauma and ulceration. In addition, menopausal women may experience changes in taste perception, often described as a metallic or bitter taste. These changes can affect dietary habits and nutritional intake, further impacting overall health.^[5,7]

Given the broad spectrum of oral health issues associated with menopause, it is crucial to implement effective preventive strategies.^[5] Regular dental checkups and professional cleanings are essential to monitor and maintain oral health.^[16] Dentists should be aware of the specific needs of menopausal women and provide tailored advice on oral hygiene practices.^[15] Fluoride treatments and the use of saliva substitutes or stimulants can help manage xerostomia. In addition, a balanced diet rich in calcium and Vitamin D is important for maintaining bone health and supporting the structural integrity of the teeth and periodontium.^[17]

Hormone replacement therapy (HRT) has been shown to alleviate some of the oral health issues associated with menopause, although it is not suitable for all women and should be considered on an individual basis.^[18] Nonpharmacological approaches, such as stress management techniques and lifestyle modifications, can also play a role in mitigating the impact of menopause on oral health.^[19]

In conclusion, menopause poses several challenges to oral health, primarily due to hormonal changes that affect the oral cavity's structure and function. By understanding these clinical implications and implementing appropriate preventive strategies, health-care professionals can significantly improve the oral health and overall well-being of menopausal women. This review will delve deeper into the specific oral health issues associated with menopause, their underlying mechanisms, and evidence-based preventive measures to address them.

MENOPAUSE ORAL HEALTH ISSUES, UNDERLYING MECHANISMS, AND EVIDENCE-BASED PREVENTIVE MEASURES

Xerostomia (dry mouth) [Figure 1]

Xerostomia, commonly known as dry mouth, is one of the most frequently reported oral health issues among menopausal women.^[20] It manifests as a subjective feeling of oral dryness, which can lead to difficulties in speaking, chewing, and swallowing.^[20] In addition, xerostomia can increase the risk of dental caries, oral infections, and mucosal discomfort.^[21]

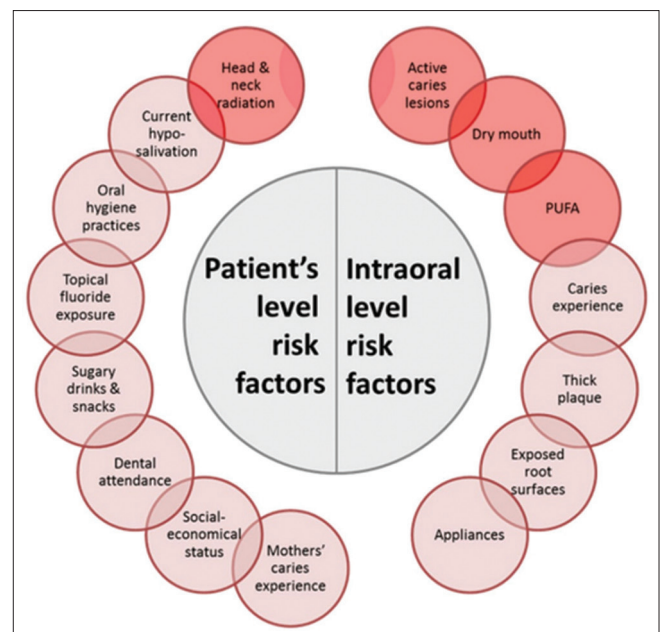


Figure 1: Risk factors associated with development of dental caries

Mechanisms

The primary underlying mechanism of xerostomia in menopausal women is the reduction in salivary gland function, which is influenced by hormonal changes.^[22] Estrogen receptors are present in salivary glands, and the decline in estrogen levels during menopause can lead to decreased salivary flow.^[17] In addition, menopause is often accompanied by the use of medications for managing various conditions such as hypertension, depression, and osteoporosis, many of which have xerostomia as a side effect.^[23]

Management and prevention

Management of xerostomia involves both symptomatic relief and preventive measures. Increasing fluid intake, using saliva substitutes or stimulants, and maintaining good oral hygiene can help alleviate symptoms.^[24] Fluoride treatments and regular dental checkups are essential for preventing dental caries. Chewing sugar-free gum and using humidifiers can also help stimulate salivary flow and maintain moisture in the oral cavity.^[4]

Periodontal disease [Figure 2]

Periodontal disease encompasses a range of inflammatory conditions affecting the supporting structures of the teeth, including the gums, periodontal ligament, and alveolar bone.^[25] In menopausal women, periodontal disease often presents as gingivitis or periodontitis, leading to symptoms such as bleeding gums, bad breath, gum recession, and eventually tooth loss if left untreated.^[25]

Mechanisms

Estrogen plays a crucial role in maintaining bone density and modulating inflammatory responses.^[26,27] The decline in estrogen levels during menopause can lead to decreased bone mineral density (BMD), making the alveolar bone more susceptible to resorption and periodontal breakdown.^[28,29] In addition, hormonal changes can alter the immune response, increasing

the susceptibility to inflammation and infection in periodontal tissues.^[30]

Management and prevention

Effective management of periodontal disease involves maintaining good oral hygiene, including regular brushing and flossing, as well as professional dental cleanings.^[31,32] Scaling and root planing, along with the use of antimicrobial mouthwashes, can help manage the bacterial load in the oral cavity.^[6,33] In severe cases, surgical interventions may be necessary. Ensuring adequate intake of calcium and Vitamin D, along with the use of HRT in appropriate cases, can help maintain bone health and mitigate the risk of periodontal disease.^[34,35]

Burning mouth syndrome

BMS is characterized by a chronic burning sensation in the oral cavity, often without any apparent clinical signs.^[36] This condition can severely impact the quality of life, causing discomfort, altered taste sensations, and psychological distress.^[8]

Mechanisms

The etiology of BMS is multifactorial, with hormonal fluctuations during menopause playing a significant role.^[13] The decline in estrogen levels can affect the mucosal tissues and peripheral nerves, leading to the sensation of burning.^[9] In addition, psychological factors such as anxiety and depression, which are common during menopause, can exacerbate the symptoms of BMS.^[10,11]

Management and prevention

Managing BMS involves a multidisciplinary approach, including addressing the underlying psychological factors through counseling or therapy.^[12,37] Topical treatments such as capsaicin or lidocaine, systemic medications like alpha-lipoic acid, and lifestyle modifications including stress management techniques

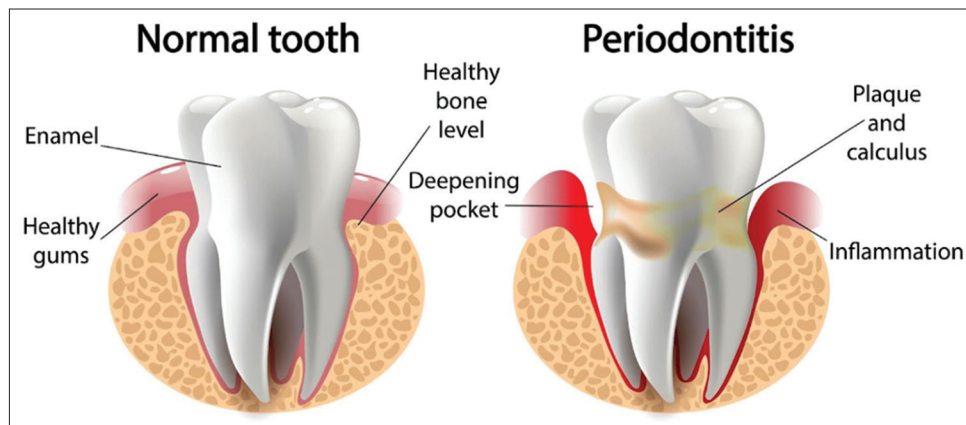


Figure 2: Periodontal disease is a chronic inflammatory condition affecting the gums and supporting structures of the teeth^[25]

can help alleviate symptoms.^[11,13] Maintaining good oral hygiene and avoiding irritants such as spicy foods and alcohol are also important.^[8,36]

Oral mucosal changes

Menopausal women often experience changes in the oral mucosa, including thinning, atrophy, and an increased tendency for ulceration and trauma. These changes can lead to symptoms such as pain, discomfort, and difficulty in wearing dentures.^[5]

Mechanisms

Estrogen receptors are present in the oral mucosal tissues, and the decline in estrogen levels during menopause can lead to decreased mucosal thickness and elasticity.^[38] This makes the mucosa more susceptible to trauma and ulceration. In addition, changes in the local microenvironment of the oral cavity, such as alterations in pH and microbial flora, can contribute to mucosal changes.^[38]

Management and prevention

Maintaining good oral hygiene and using protective measures such as soft-bristled toothbrushes can help prevent mucosal trauma.^[38] Topical treatments such as corticosteroids or protective barriers can aid in the healing of ulcerations. Regular dental checkups are essential for monitoring and managing mucosal health. In cases where dentures are involved, ensuring proper fit and making necessary adjustments can help prevent trauma to the mucosal tissues.^[38]

Altered taste sensation

Menopausal women often report changes in taste perception, described as a metallic or bitter taste. These alterations can affect dietary habits and nutritional intake, further impacting overall health.^[39]

Mechanisms

The decline in estrogen levels during menopause can affect the taste buds and the neural pathways involved in taste perception.^[38,39] In addition, xerostomia and oral mucosal changes can alter the taste sensations. Certain medications commonly used during menopause can also have side effects that impact taste.^[25]

Management and prevention

Addressing the underlying cause of altered taste sensation is crucial. Managing xerostomia and oral mucosal health can help improve taste perception. Reviewing and adjusting medications with the help of a health-care provider can also be beneficial.^[3] Maintaining good oral hygiene and using taste-enhancing strategies such as the use of flavor-rich foods and spices can help improve the overall eating experience.^[3,5]

Osteoporosis and oral health

Osteoporosis is a common condition in postmenopausal women, characterized by decreased bone density and increased risk of fractures.^[13,40] This condition can have significant implications for oral health, particularly in terms of the alveolar bone that supports the teeth.

Mechanisms

The decline in estrogen levels during menopause leads to increased bone resorption and decreased bone formation, resulting in osteoporosis.^[8] In the oral cavity, this manifests as reduced alveolar bone density, making the teeth more susceptible to mobility and loss. In addition, osteoporosis can affect the maxillary and mandibular bones, complicating dental procedures such as extractions and implant placements.^[9]

Management and prevention

Preventing and managing osteoporosis involves ensuring adequate intake of calcium and Vitamin D, engaging in weight-bearing exercises, and considering HRT when appropriate.^[41] In the context of oral health, maintaining good periodontal health is crucial to prevent bone loss. Regular dental checkups and monitoring bone density can help manage the oral health implications of osteoporosis. In cases where dental implants are considered, careful assessment and planning are necessary to ensure adequate bone support.^[40,42]

Salivary gland hypofunction

Salivary gland hypofunction is characterized by a decrease in the production and secretion of saliva, leading to symptoms such as dry mouth, difficulty swallowing, and an increased risk of dental caries and oral infections.^[43]

Mechanisms

Hormonal changes during menopause, particularly the decline in estrogen levels, can lead to salivary gland hypofunction.^[44] Estrogen receptors in the salivary glands influence their function, and reduced estrogen levels can result in decreased salivary flow. In addition, systemic conditions such as Sjögren's syndrome, which is more common in postmenopausal women, can contribute to salivary gland hypofunction.^[44]

Management and prevention

Managing salivary gland hypofunction involves both symptomatic relief and preventive measures. Increasing fluid intake, using saliva substitutes, and stimulating salivary flow through chewing gum or mints can help alleviate symptoms.^[45] Regular dental checkups and maintaining good oral hygiene are essential for preventing dental caries and infections. In cases where systemic

conditions such as Sjögren's syndrome are involved, appropriate medical management is necessary.^[43-45]

Oral lichen planus

Oral lichen planus (OLP) is a chronic inflammatory condition that affects the mucous membranes of the oral cavity, presenting as white lacy patches, red swollen tissues, or open sores. It can cause symptoms such as pain, burning, and discomfort.^[46,47]

Mechanisms

The exact cause of OLP is unknown, but it is believed to be an immune-mediated condition. Hormonal changes during menopause may influence the immune system, potentially exacerbating the condition.^[48,49] In addition, psychological stress, which is common during menopause, can trigger or worsen OLP.

Management and prevention

Management of OLP involves reducing inflammation and managing symptoms. Topical corticosteroids are commonly used to control inflammation and pain. Good oral hygiene practices and regular dental checkups are essential for managing the condition.^[49,50] In severe cases, systemic medications such as corticosteroids or immunosuppressants may be necessary. Addressing psychological stress through counseling or stress management techniques can also be beneficial.^[49,50]

FEW CASE STUDIES

Salivary flow rates and oral health in menopausal women

Salivary flow rates are closely linked to estrogen status, with postmenopausal women exhibiting lower flow rates than their menstruating counterparts. Minicucci *et al.* investigated salivary flow rates in menopausal women compared to premenopausal women using a chemical absorption stimulation test. Participants provided three saliva samples: nonstimulated saliva (S1), saliva stimulated with two drops of 2.5% citric acid (S2), and saliva superstimulated with two drops of 2.5% citric acid every 30 s for 2 min (S3). Results showed that salivary flow was significantly lower in menopausal women for S2 and S3, suggesting a link to xerostomia.^[3,15,38,39,43]

Yalçin *et al.* assessed oral complaints in 348 women at a menopausal clinic, finding oral dryness as the most common symptom, particularly in non-HRT users.^[51] In a separate Turkish study, Yalçin *et al.* compared salivary flow in 14 menopausal women and 14 premenopausal controls. They observed decreased salivary flow in menopausal women, which increased with HRT use, while salivary pH, electrolytes, and calcium levels remained unchanged.^[51] An Iranian study on 42 menopausal women (21 with xerostomia,

21 without) revealed significantly higher mean calcium concentrations in the xerostomic group. Another study by the same authors compared 38 menopausal women (ages 41–77) with oral dryness to asymptomatic controls, showing that the former had significantly lower salivary beta-estradiol concentrations and hormone output.^[38] In addition, Agha-Hosseini *et al.* explored the relationship between lumbar spine BMD and oral dryness in 60 menopausal women, discovering a significant negative correlation between BMD and xerostomia.^[38] These studies underscore the intricate link between hormonal changes during menopause and oral health, highlighting the importance of monitoring and managing salivary flow rates to prevent xerostomia and related complications.

Imirzalioglu *et al.* demonstrated the effect of age on the degree of ridge resorption, suggesting a multifactorial nature to this phenomenon.^[5] Sultan and Rao conducted a cross-sectional study on 80 postmenopausal women with generalized chronic periodontitis, finding significant correlations between age, years since menopause, body mass index, and BMD.^[38] While clinical attachment loss and alveolar bone loss showed nonsignificant correlations with BMD, osteopenia emerged as a risk indicator for periodontal disease in menopause.^[38]

Volpe *et al.* conducted a study administering conjugated estrogens to postmenopausal women experiencing oral discomfort.^[52] They observed that HRT improved subjective and objective symptoms in over 50% of patients.^[53] Similarly, Forabosco *et al.* evaluated the effect of HRT on oral discomfort symptoms, suggesting that estrogens may improve the clinical picture in select postmenopausal women. Immunohistochemical identification of estrogen receptors may aid in identifying patients who would benefit from HRT.^[54] In contrast, Tarkkila *et al.* investigated the prevalence of self-assessed sensations of painful mouth and dry mouth in menopausal women, finding that while these symptoms were associated with climacteric symptoms, HRT did not prevent or improve them.^[55] However, Yalçin *et al.* did not observe differences in salivary pH or electrolyte levels in postmenopausal women with or without HRT. Nevertheless, hormone replacement, along with alendronate and calcium, improved saliva flow rate in women with oral symptoms, suggesting a potential benefit of combination therapy.^[51]

Tarkkila *et al.* conducted a longitudinal study analyzing the dental health of menopausal women with and without HRT over a 2-year period. While no difference was observed in dental parameters or salivary flow rates between the groups, women using HRT demonstrated a more health-conscious

attitude, receiving more dental restorations and reporting more frequent dental appointments.^[51] Giuca *et al.* compared estrogens with phytotherapy in treating oral cavity symptoms in menopausal women, finding that HRT led to greater improvement in oral symptoms compared to phytotherapy. Estrogens were particularly effective in inducing salivary changes, while both therapies had similar effects on gingivitis, bleeding, and taste changes.^[56] In addition, the role of estradiol in improving saliva flow and buffer capacity in postmenopausal women, observing a significant increase in saliva flow and reduction in dry mouth complaints with HRT.^[56]

Leimola-Virtanen *et al.* studied the effect of HRT on saliva composition in menopausal women, finding that certain salivary components such as proteins, immunoglobulins, and salivary peroxidase were estrogen dependent.^[57] However, salivary gland function was not significantly influenced by menopause or HRT among healthy women. Tarkkila *et al.* conducted a randomized study comparing salivary flow rates and dental status in peri- and postmenopausal women with and without HRT.^[43,55] While no differences were observed initially, women in the HRT group demonstrated a more health-conscious attitude over the 2-year follow-up period. Taguchi *et al.* suggested that variations in the response to HRT may be influenced by factors such as the presence of estrogen receptors and Vitamin D gene polymorphisms.^[57] A systematic review on the cost of dental care in postmenopausal women with osteoporosis, with or without HRT use found that women receiving HRT had lower incidences of adverse dental outcomes and incurred lower dental care costs compared to those not receiving HRT.^[38]

CONCLUSION

Menopause brings about significant hormonal changes that have profound implications for oral health. The decline in estrogen levels affects various aspects of the oral cavity, leading to conditions such as xerostomia, periodontal disease, BMS, oral mucosal changes, altered taste sensation, osteoporosis-related oral health issues, salivary gland hypofunction, and OLP. Understanding the underlying mechanisms of these conditions is crucial for developing effective management and preventive strategies. Regular dental checkups, good oral hygiene practices, and addressing the specific needs of menopausal women through tailored treatments and lifestyle modifications can significantly improve their oral health and overall well-being. This comprehensive review highlights the importance of a multidisciplinary approach in managing the oral health issues associated with menopause, emphasizing the need for collaboration

between dental professionals, medical practitioners, and patients to achieve optimal health outcomes.

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Conflicts of interest

There are no conflicts of interest.

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