

# Menopause and oral health

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## ABSTRACT

At menopause, a woman's body undergoes radical hormonal changes, which predisposes to damage of the oral cavity. The onset of menopause is a series of morphofunctional physiological adaptive changes with systemic and oral action in women. Oral health is closely related to dental hygiene, a major concern in menopause. The addressability of women to dental services tends to increase due to perimenopausal changes that occur in the gums and teeth and the oral microbiome. These changes have a hormonal substrate that significantly influences the evolution of oral health. The purpose of this review is to understand the occurrence and evolution of oro-dental complications in menopause and the systematization of therapeutic regimens. The PubMed and Web Of Science databases searched identified approximately 21 eligible articles. Periodontal damage is the most common, followed by dryness and burning sensation in the mouth. The role of hormone replacement therapy is controversial in terms of prophylaxis or the obvious therapeutic aspect of menopausal women with oral symptoms. The lack of extensive research, at least for the time being, does not establish clear therapeutic protocols to resolve these dental conditions.

**Keywords:** menopause, oral health, oral cavity, sex hormones

## INTRODUCTION

Spontaneous menstrual discontinuation for 12 consecutive months in women > 45 years of age defines menopause. The process of menopause is marked by a decrease in hormonal activity, which has as a substrate the transition to a series of more or less dramatic symptoms. The clinical picture is accompanied by physiological changes of the genitals and psycho-affective disorders; this transformation is perceived by women to a different degree as being associated with the aging process [1].

After the crucial moment in 2002 when the Women's Health Initiative (WHI) highlighted the existence of important adverse effects related to the association of cardiovascular diseases and thromboembolic risk, which led to a reluctance on the part of clinicians to administer hormone replacement therapy (HRT). This has led to major discomfort and a marked decrease in patients' quality of life in/at a sensitive time in life [2].

In recent years, it has led to a reconsideration of this attitude, bringing to the fore the improvement

of symptoms, especially vasomotor, genitourinary, and osteoporosis prevention [3].

Hormone replacement therapy involves several risks, we must not forget the benefits, so the most accurate counseling of patients plays a particularly important role in the risk-benefit balance. This requires the determination of the type of hormone therapy (HT) in agreement with the clinician depending on the mechanism of action, the dosage, the period of use, as well as the time of initiation of this therapy [4].

Although some recommendations from the relevant associations must be followed, therapeutic management must be personalized if the situation requires it. Of course, it must be interrupted if there are a series of side effects or increased oncological risk [5]. HRT has a protective effect on the risk of colon cancer (reduce with 10% the risk of all gastrointestinal tract cancer), so the data are inconclusive for cervical, ovarian and breast cancer; continuous combined regimen, seems to reduce non-significant the risk of endometrial cancer [6].

Menopause is a major public health problem that requires a strategy of prophylactic measures to reduce complications that occur 5-10 years after menopause. However, little is known about HRT and its effect on oral health [7].

The purpose of this article is to assess the latest research on the status of oral health data for menopausal women in the last ten years and recent studies on treatment regimens.

## MATERIALS AND METHODS

In the present article, the authors have performed a comprehensive descriptive review according to searching original published data on menopause in humans, with a filter on the oral health in premenopausal and menopausal women. Additional criteria included published articles in a peer-reviewed journal, written in English and among the last ten years. The electronic search was performed in two major databases, PubMed and Web of Science, with the MeSH keywords: “menopause” AND “oral health”, OR “oral cavity” OR “hormone replacement therapy”.

Inclusion criteria were: menopausal women, premenopausal women, oral health and undergoing hormone replacement therapy.

Data extraction: author(s), country, year of publication, the aim of the study, and main results; the articles were screened by title, abstract, and full text and were excluded duplicates and off-topic articles.

One author performed data analysis; almost 956 studies on oral health in menopause or pre-menopause were screened for eligibility. The quality of the studies selected was utterly evaluated. The pres-

ent study included 21 papers centered on oral health in menopause.

## FEMALE SEX HORMONES AND ORAL MUCOSA

Sex steroid hormones are important in maintaining oral health. Stages in a woman's life such as puberty, menstruation, menopause, or pregnancy, which involve hormonal changes, cause periodontal damage. Estrogen, progesterone, androgen receptors are present in periodontal tissues. Estrogens play a role in the synthesis and maintenance of fibrous collagen and the cytodifferentiation of the stratified squamous epithelium, and progesterone has a role in bone formation and reabsorption [8].

The salivary environment is a concern of dentists, the hormonal dosages of cortisol, estradiol, and progesterone being used in the study and monitoring of diseases of the oral cavity.

The advantages of salivary doses are related to the reproducible aspect, the ease of harvesting, the good compliance of the patients.

These hormones' biologically active free fraction is closely correlated with salivary levels. Cortisol is a steroid hormone that is 90% plasma bound to globulin (CBG) and albumin; 10% is represented by the biologically active free component. The plasma concentration of cortisol is double that of salivary saliva. The role of salivary cortisol in the study of Hellhammer et al. as a marker of psychological stress was highlighted [9].

Salivary estradiol dosing is a non-invasive method of assessing the hormonal status of menopausal women [10]. Mariotti and Cochran identified a decrease in collagen and non-collagen protein synthesis in the gingival fibroblasts of premenopausal women [11]. Another study shows that high estrogen levels cause a reduction in gingival epithelial cell proliferation [12].

Also, sex steroid hormones are involved in cell proliferation, differentiation, and growth in gum keratinocytes and fibroblasts. In addition, they increase the rate of folic acid metabolism in the oral mucosa and thus can affect tissue repair [13].

## MENOPAUSE AND THE EFFECTS ON ORAL HEALTH

Perimenopausal hormonal changes in the oral cavity are characterized by an increased risk of advanced forms of gingivitis and chronic periodontitis, secondary to gingival alterations and bone damage to the jaw with changes in dental anchorage and increased tooth mobility.

The clinical picture is dominated by the sensation of the painful oral syndrome, dry mouth, of oral discomfort characterized by the sensation of burning, altered taste, mandibular dysfunction, mouth ulcers or atrophies of the gingival mucosa.

These oral changes are harmonized by general climacteric changes.

The etiopathogenesis of these symptoms may be associated with reduced salivary flow and alteration of the oral microbiome, accentuated by partial or total removable prostheses. In addition, during menopause, the composition of saliva changes in salivary protein and calcium levels.

### Mucosal affections

Anxiety and depression in menopause reduce immunity, favoring the appearance of oral conditions, such as aphthous ulcer and lichen planus, with burning sensation of the oral mucosa. In these situations, the treatment must require the cooperation of a dentist / gynecologist [14].

At menopause, gingivostomatitis can also be found, which presents with pale and dry gingival mucosa, erythematous and sometimes bleeding [14]. Other mucosal conditions that can be encountered are oral candidiasis and pemphigus.

### Xerostomia

Xerostomy is one of the most common oral sensory complaints in menopausal women, and is defined as a dry mouth. Xerostomia is related to the appearance of an anxiety syndrome that affects patients' quality of life without being objectified any difference in the composition and salivary flow in premenopausal and menopausal women [15].

### Periodontal disease

The condition of the periodontium in different stages of the woman is subject to the action of various levels of hormones in response to the action on estrogen receptors in osteoblasts and fibroblasts [16].

The severity of periodontal disease forms depends on the patient's age, with an increased incidence of postmenopause [17]. The etiopathogenic mechanisms are represented by vasomotor disorders in the oral microcirculation, alveolar bone resorption possibly correlated with the process of osteoporosis, damage to the oral microbiome, predisposition to inflammatory phenomena, dental hypermobility by loss of attachment to the alveolar subcrestal bone. The latter mechanism is not fully established because studies show an increased risk of tooth loss in women with advanced osteoporosis and its exacerbation postextractionally, while another study shows no change compared to premenopausal women [8,12].

In a cross-sectional study, Sultan and Rao showed that in postmenopausal women with chronic periodontitis, osteopenia is a risk factor for periodontal disease [18]. In postmenopausal women, the inci-

dence of periodontitis is increased in association with *Prevotella gingivalis* and *Tannerella forsythensis* [19].

Treatment is based primarily on prophylactic measures to maintain good oral hygiene, reduce the accumulation of tartar, a trophic gingival mucosa, and remove plaque. All this, together with hormone therapy (HT), are aimed at improving oral symptoms and better oral health.

### Burning mouth syndrome

Burning mouth syndrome (BMS) is a chronic condition, defined as pain accompanied by a burning sensation in the mouth [20].

Salivary progesterone was correlated with the expression of the epithelial MUC1 gene of the oral mucosa and with salivary cortisol. In contrast, salivary 17 $\beta$ -estradiol was correlated with the duration of symptoms and the severity of oral manifestations. The severity of the oral burning sensation was negatively correlated with cortisol concentration and cortisol / DHEA ratio in unstimulated whole saliva (UWS) samples. Thus, in postmenopause, psychoendocrine impairment may affect the clinical picture of the burning sensation of the mouth and the expression of the oral mucosa MUC1 [21].

Kim et al. showed that BMS had higher cortisol levels in UWS and 17 $\beta$ -estradiol in stimulated whole saliva samples and that older patients had lower levels of progesterone in UWS [22].

### HRT FOR MENOPAUSE AND ORAL HEALTH

HRT is a therapy that addresses climacteric symptoms (vasomotor, urogynecological), prevention of osteoporosis and improvement of quality of life. The effects of HRT with implications in the oral cavity are dependent on dose, mode of administration, duration of treatment, age (premenopause versus postmenopause), comorbidities, estrogen / progesterone component, drug interactions [23].

In women with oral symptoms, the combination of alendronate and calcium with HRT increased salivary flow. In contrast, salivary pH was not influenced by menopause or HRT [24]. In menopause, there is an increase in Na<sup>+</sup> levels, a decrease in K<sup>+</sup> levels, and no change in Cl<sup>-</sup> and Ca<sup>++</sup> levels. HRT intervenes on Na<sup>+</sup> and K<sup>+</sup> levels, causing an increase and stabilization, respectively [25].

Hormone replacement therapy (HRT) based on estrogen compounds or estrogen-progesterone combination reduces menopause disorders and the long-term effects of hypoestrogenism. In terms of saliva composition, pH and flow, HRT did not change compared to women who did not use HRT. The combination of alendronate, calcium supplements and HRT improves salivary flow [26].

Tarkkila et al. assessed oral health status in women who underwent HRT and found a reduction after 2 years of treatment of species such as *Prevotella intermedia*, *Prevotella gingivalis* and *Tannerella forsythia*, without significantly influencing the oral microbiome [23].

LaMonte et al. in a 5-year study showed a progressive reduction in alveolar ridge height in postmenopausal women with major estrogen deficiency and altered subgingival microbiome [27].

A number of studies have shown an increase in alveolar bone density in postmenopausal patients with osteoporosis following HRT administration [28]. In menopause, use in women with chronic periodontitis as an adjunct to descaling of bisphosphonate therapy (risedronate 5 mg once daily) significantly improves the condition of the periodontium [28,29]. Risedronate therapy causes a decrease in gingival inflammation, a higher density of the alveolar bone, an increase in periodontal attachment, and a reduction in plaque [29].

Wang et al. evaluated 60 menopausal women through a xerostomic questionnaire and salivary estradiol measurement after HRT initiation and found that hormone replacement therapy significantly reduced oral symptoms and increased average salivary estradiol [30].

Estrogen given to menopausal women can reduce tooth loss by strengthening the attachment around the teeth [31]. In menopause, in women with periodontal disease, HRT (estrogen therapy) accelerates healing by acting on interleukin levels (IL 1 $\beta$  and IL 6) [32].

Grodstein et al. observed that patients who used HRT had a 24% lower tooth loss compared to the control group [33].

## CONCLUSIONS

Oral health is influenced by the onset of menopause, and the role of sex hormones in maintaining the morphofunctional integrity of the oral cavity is partially elucidated. Extensive clinical trials are needed to identify the biomarkers needed to assess the effect of sex hormones and the microbiome on oral health.

The knowledge by the dentist before establishing the therapeutic behavior of the menopausal patient, the state of health, the HRT status, as well as the particularities related to the associated diseases.

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