Original Article

Oral Health Alterations Associated With Menopause: A Comparative Analysis of Pre- and Post-Menopausal Women

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Abstract

Background: Menopause is a natural physiological transition characterized by a decline in estrogen and progesterone levels, which can influence both systemic and oral health. The presence of estrogen receptors in oral tissues renders them susceptible to hormonal fluctuations, leading to various oral complaints. However, these manifestations are often under-recognized in clinical practice. The present study aimed to evaluate and compare oral health alterations, including oral and psychological symptoms, dental status, periodontal health, and clinical findings, between premenopausal and postmenopausal women.

Materials and Methods: A cross-sectional comparative study was conducted among 200 women, comprising 100 premenopausal and 100 postmenopausal participants. Data were collected using a structured questionnaire covering demographic details, oral and psychological symptoms, and oral hygiene practices. Clinical examination assessed dental status, periodontal condition, and oral mucosal changes. Statistical analysis was performed using descriptive statistics and Chi-square test, with $p < 0.05$ considered statistically significant.

Results: Postmenopausal women demonstrated a significantly higher prevalence of oral symptoms such as xerostomia (48% vs. 18%), burning mouth sensation (20% vs. 2%), altered taste (45% vs. 19%), halitosis (38% vs. 12%), orofacial pain (43% vs. 6%), and dysphagia (40% vs. 5%) ($p < 0.05$). Psychological symptoms including depression, anxiety, sleep disturbances, and memory impairment were also more frequent. Furthermore, postmenopausal women exhibited reduced dentition, increased prosthetic needs, poorer oral hygiene practices, and higher occurrence of mucosal conditions.

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Conclusion: Postmenopausal women experience significantly greater oral and psychological health alterations compared to premenopausal women, highlighting the importance of targeted preventive and therapeutic oral healthcare strategies during menopause.

Keywords: Menopause, oral health, xerostomia, oral diseases, psychological symptoms, tooth loss

Introduction

Menopause is a physiological event characterized by the permanent cessation of menstruation resulting from the loss of ovarian follicular activity, usually occurring between 45 and 55 years of age.[1] With increased life expectancy, women spend a substantial portion of their lives in the postmenopausal period, making menopause-related health concerns an important public health issue.[2] The menopausal transition is associated with a decline in estrogen and progesterone levels, leading to various systemic, psychological, and oral changes.[3]

Estrogen plays an important role in maintaining the integrity of oral mucosa, salivary gland function, and periodontal health. Estrogen receptors are present in oral tissues, including the gingiva, periodontal ligament, oral mucosa, and salivary glands.[4] Reduced estrogen levels during menopause may therefore contribute to oral manifestations such as xerostomia, burning mouth sensation, altered taste perception, halitosis, mucosal changes, periodontal disease, and tooth loss.[5,6] In addition, reduced salivary flow and changes in salivary composition may compromise oral defense mechanisms, increasing susceptibility to dental caries and oral infections.[6]

Hormonal fluctuations during different phases of a woman's life, including puberty, pregnancy, and menopause, are known to influence periodontal tissues and inflammatory responses.[7] Postmenopausal estrogen deficiency has been associated with increased periodontal inflammation, attachment loss, and alveolar bone resorption, thereby affecting overall oral health status.[8] Psychological disturbances such as anxiety, depression, sleep disorders, and cognitive difficulties are also frequently reported during menopause and may further influence oral hygiene practices and quality of life.[9]

Although previous studies have investigated oral manifestations associated with menopause, comparative data evaluating oral health differences between premenopausal and postmenopausal women in the Indian population remain limited. Therefore, the present study was undertaken to assess and compare oral symptoms, psychological manifestations, periodontal status, oral hygiene practices, and oral clinical findings among premenopausal and postmenopausal women attending a dental institution in Maharashtra, India.

Materials and Methods

Study Design and Setting

A cross-sectional comparative study was conducted among women attending the Outpatient Department of Oral Medicine and Radiology at the School of Dental Sciences, Krishna Vishwa Vidyapeeth (Deemed to be University), Karad, Maharashtra, India. The study was carried out over a period of ten months from June 2025 to March 2026.

Study Population

The study included a total of 200 women, comprising 100 premenopausal women and 100 postmenopausal women. Premenopausal women aged 35–45 years with regular menstrual cycles were included in Group I, whereas postmenopausal women aged 45–60 years with cessation of menstruation for at least 12 consecutive months were included in Group II.

Inclusion and Exclusion Criteria

Women who fulfilled the age criteria and were willing to participate in the study were included after obtaining written informed consent.

Women with systemic conditions known to affect oral health, such as uncontrolled diabetes mellitus, autoimmune disorders, salivary gland diseases, or severe systemic illnesses, were excluded. Participants receiving hormone replacement therapy or medications affecting salivary flow, as well as those with a history of head and neck radiotherapy or chemotherapy, were also excluded from the study.

Data Collection

Data were collected using a structured and prevalidated questionnaire followed by a comprehensive clinical oral examination. The questionnaire included demographic details, menstrual history, oral symptoms, psychological symptoms, and oral hygiene practices.

Oral symptoms assessed included xerostomia, burning mouth sensation, altered taste, halitosis, orofacial pain, and difficulty in swallowing. Psychological symptoms included depressed mood, anxiety, sleep disturbances, and memory or concentration difficulties.

Clinical examination was performed using a mouth mirror and Community Periodontal Index (CPI) probe under standard infection control precautions. Dental status, including the number of teeth present and prosthetic status, was recorded. Periodontal condition was categorized as healthy gingiva, gingivitis, or periodontitis based on clinical findings. Oral mucosal examination included assessment of xerostomia, fissured tongue, bald tongue, lichenoid reactions, ulcerative lesions, and tobacco pouch keratosis.

Ethical Considerations

The study protocol was reviewed and approved by the Institutional Ethical Committee of Krishna Vishwa Vidyapeeth (Deemed to be University), Karad. Written informed consent was obtained from all participants prior to enrollment, and confidentiality of participant information was maintained throughout the study.

Statistical Analysis

Data were entered into Microsoft Excel and analyzed using Statistical Package for the Social Sciences (SPSS) software version XX. Descriptive statistics were used to summarize the data. Categorical variables were expressed as frequencies and percentages, while continuous variables were expressed as mean ± standard deviation. The Chi-square test was applied to compare categorical variables between the two groups. A p-value of less than 0.05 was considered statistically significant.

Results

Demographic Characteristics

The mean age of the participants was 41 ± 5 years in the premenopausal group and 54 ± 5 years in the postmenopausal group (Table 1). A higher proportion of premenopausal women resided in urban areas (56%), whereas postmenopausal women were predominantly from rural areas (58%). Educational attainment was comparatively higher among premenopausal women, while 28% of postmenopausal women had no formal education. Employment was more common among premenopausal women (57%), whereas the majority of postmenopausal women were homemakers (72%). The mean age at menopause among postmenopausal women was 46 ± 4 years.

Table 1: Demographic Characteristics of Premenopausal and Postmenopausal Women

Demographic Charecteristics	Premenopausal (n=100)	Postmenopausal (n=100)
Age (years), Mean ± SD	41+-5	54+-5
Current Residence, n (%)		
Urban	56 (56%)	42 (42%)
Rural	44 (44%)	58(58%)
Educational Qualification, n (%)		
No formal education	0 (%)	28(28%)
Primary school	42 (42%)	5 (5%)
Secondary school	36 (36%)	18(18%)
Higher Education	22(22%)	0(0%)
Occupation, n (%)		
Employment (Full-time/ Part time	57 (57%)	9(9%)
Retired	0(0%)	19(19%)
Homemaker	43 (43%)	72(72%)
Age at Menopause (years), Mean ± SD	-	46+

SD = Standard Deviation

Oral and Psychological Symptoms

Postmenopausal women exhibited a significantly higher prevalence of oral symptoms compared to premenopausal women (Table 2). The most commonly reported symptoms among postmenopausal women were dry mouth (48% vs. 18%), burning mouth sensation (20% vs. 2%), altered taste (45% vs. 19%), halitosis (38% vs. 26%), orofacial pain (43% vs. 6%), and difficulty in swallowing (40% vs. 5%). All observed differences were statistically significant ($p < 0.001$).

Psychological symptoms were also significantly more prevalent among postmenopausal women. Depressed mood was reported by 35% of postmenopausal women compared to 7% of premenopausal women. Similarly, memory/ concentration difficulties (60% vs. 18%), anxiety/ fear (47% vs. 14%), and sleep disturbances (58% vs. 21%) were more frequently observed in the postmenopausal group. These differences were statistically significant ($p < 0.001$).

Table 2. Comparison of Oral and Psychological Symptoms Between Premenopausal and Postmenopausal Women

Symptoms	Premenopausal women (n=100)		Postmenopausal women (n=100)		p- value
	Present n (%)	Absent n (%)	Present n (%)	Absent n (%)	
Dry mouth	18 (18%)	82(82%)	48(48%)	52(52%)	0.000013
Burning mouth sensation	2(2%)	98(98%)	20(20%)	80(80%)	0.000122
Altered taste	19(19%)	81(81%)	45(45%)	55(55%)	0.000151
Halitosis (Altered Breath)	12(12%)	74(74%)	38 (38%)	62(62%)	0.000045
Oro-facial pain	6(6%)	94(94%)	43(43%)	57(57%)	<0.000001
Difficulty in swallowing	5(5%)	95(95%)	40(40%)	60(60%)	<0.000001
Depressed mood	7(7%)	93(93%)	35(35%)	65(65%)	0.000003
Memory / Concentration difficulty	18(18%)	82(82%)	60(60%)	40(40%)	<0.000001
Anxiety/ Fear	14(14%)	86(86%)	47 (47%)	53(53%)	0.000001
Sleep Disturbances	21(21%)	79(79%)	58(58%)	42(42%)	<0.000001

Chi-square test; $p < 0.05$

Dental Status, Periodontal Health, and Oral Hygiene Practices

Premenopausal women demonstrated better dental status compared to postmenopausal women (Table 3). A significantly higher proportion of premenopausal women had more than 20 natural teeth (90% vs. 70%, $p = 0.001$), whereas tooth loss (<20 teeth) was more prevalent among postmenopausal women (30% vs. 10%, $p = 0.001$). The use of removable partial dentures and fixed partial dentures was significantly more common among postmenopausal women ($p < 0.01$).

With respect to periodontal health, healthy periodontal status was observed more frequently among premenopausal women (50% vs. 30%, $p = 0.01$). Although gingivitis and periodontitis were more prevalent in postmenopausal women, the differences were not statistically significant.

Oral hygiene practices also differed between the two groups. Brushing less than once daily was significantly more common among postmenopausal women (15% vs. 5%, $p = 0.03$). In addition, a higher proportion of postmenopausal women visited the dentist only when experiencing dental complaints (60% vs. 40%, $p = 0.005$), whereas regular annual dental visits were more common among premenopausal women (45% vs. 30%, $p = 0.02$).

Table 3: Comparison of dental status, periodontal diagnosis, and oral hygiene practices between premenopausal and postmenopausal women

Characteristics	Premenopausal women (n=100)		Postmenopausal women (n=100)		p- value
	Present n (%)	Absent n (%)	Present n (%)	Absent n (%)	
No. of teeth Present(>20)	90 (90%)	10(10%)	70 (%)	30 (30%)	0.001
No. of teeth Absent (<20)	10(10%)	90(90%)	30 (30%)	70 (%)	0.001
Presence of Removable Partial Denture (RPD)	10(10%)	85(85%0	35(35%)	65(65%)	0.005
Presence of Fixed Partial Denture (FPD)	50(50%)	90(90%)	25(25%)	75(75%)	0.002
Periodontal Diagnosis					
Healthy periodontium	50(50%)	50(50%)	30 (30%)	70 (%)	0.01
Gingivitis	30 (30%)	60(60%)	40 (40%)	60(60%)	0.20
Periodontitis	20(20%)	80(80%)	30 (30%)	70 (%)	0.10
Tooth brush frequency					
<1 time/day	5(5%)	95(95%)	15(15%)	85(85%)	0.03
Once daily	60(60%)	40(40%)	50(50%)	50(50%)	0.10
≥2 times/day	35(35%)	65 (65%)	35(35%)	65(65%)	1.00
Dental visit frequency					
Only during dental complaint	40(40%)	60(60%)	60(60%)	40(40%)	0.005
Once yearly	45(45%)	55(55%)	30 (30%)	70 (%)	0.02
Twice yearly	15(15%)	85(85%)	10(10%)	90(90%)	0.40

RPD = Removable Partial Denture; FPD = Fixed Partial Denture.Chi-squaretest ; $p < 0.05$

Oral Clinical Findings

Postmenopausal women demonstrated a significantly higher prevalence of several oral clinical findings compared to premenopausal women (Table 4). Xerostomia was observed in 42% of postmenopausal women compared with 20% of premenopausal women ($p = 0.0038$). Similarly, halitosis (38% vs. 3%, $p < 0.0001$) and fissured tongue (18% vs. 3%, $p = 0.0093$) were significantly more common among postmenopausal women.

Although bald tongue, lichenoid reactions, ulcerative lesions, and tobacco pouch keratosis were observed in both groups, the differences were not statistically significant ($p > 0.05$).

Table 4: Comparison of oral clinical findings between premenopausal and postmenopausal women.

Oral Clinical Findings	Premenopausal women (n=100)		Postmenopausal women (n=100)		p value
	Present n (%)	Absent n (%)	Present n (%)	Absent n (%)	
Xerostomia	20(20%)	80 (80%)	42(42%)	58(58%)	0.0038
Halitosis	3(3%)	97 (97%)	38(38%)	62(62%)	<0.0001
Bald tongue	0 (0%)	100(100%)	2(2%)	98(98%)	0.1556
Fissured Tongue	3(3%)	97(97%)	18(18%)	82(82%)	0.0093
Oral Mucosal Lesions					
Lichenoid reaction	1(1%)	99(99%)	3(3%)	97(97%)	0.6212
Ulcerations	15(15%)	85(85%)	10(10%)	90(90%)	0.38
Tobacco pouch keratosis	1(1%)	99(99%)	6(6%)	94(94%)	0.054

Discussion

Menopause is a physiological transition associated with progressive decline in ovarian hormones, particularly estrogen, resulting in multiple systemic and oral health alterations. The findings of the present study demonstrated that postmenopausal women experienced significantly greater oral symptoms, adverse oral clinical findings, poorer dental status, and compromised oral hygiene practices compared to premenopausal women. These observations support the important role of hormonal changes in influencing oral health during the menopausal period.

The mean age of menopause observed in the present study was 46 years, which is consistent with previous Indian studies reporting menopause between 44 and 47 years of age.[1,4,6] Earlier menopause among Indian women compared to Western populations may be influenced by genetic predisposition, nutritional factors, socioeconomic conditions, and lifestyle variations.[10-12]

Sociodemographic findings in the present study showed lower educational status and higher homemaker prevalence among postmenopausal women. Lower literacy levels and socioeconomic status may contribute to inadequate oral health awareness, irregular dental visits, and poor oral hygiene practices.[13] These factors can further aggravate oral health problems during menopause.

Postmenopausal women in the present study reported significantly higher prevalence of xerostomia, burning mouth sensation, altered taste, halitosis, and orofacial pain. Estrogen deficiency plays an important role in these manifestations because estrogen receptors are present in salivary glands and oral mucosal tissues. Reduced estrogen levels may impair salivary gland secretion, alter salivary composition, and decrease mucosal lubrication, resulting in xerostomia and oral discomfort.[13,14] Saliva performs essential protective functions including lubrication, buffering capacity, antimicrobial activity, and maintenance of oral microbial balance. Therefore, reduction in salivary flow may increase susceptibility to dental caries, mucosal irritation, halitosis, and opportunistic infections.[15,16]

Psychological symptoms such as anxiety, depressed mood, memory difficulties, and sleep disturbances were also significantly more common among postmenopausal women. Hormonal fluctuations during menopause can influence neurotransmitter activity, particularly serotonin and gamma-aminobutyric acid pathways, contributing to psychological disturbances.[17,18] These psychological factors may indirectly affect oral health by reducing motivation for oral hygiene maintenance, increasing stress-related parafunctional habits, and negatively influencing healthcare-seeking behavior.[19]

The present study also demonstrated poorer dental status among postmenopausal women, including greater tooth loss and increased prosthetic rehabilitation needs. Estrogen plays a crucial role in maintaining bone metabolism by regulating osteoblastic and osteoclastic activity. Declining estrogen levels during menopause enhance osteoclastic bone resorption and reduce bone mineral density, including alveolar bone supporting the teeth.[20, 21] Increased alveolar bone loss may predispose postmenopausal women to tooth mobility, periodontal attachment loss, and eventual tooth loss. Similar findings of increased tooth loss and prosthetic needs among postmenopausal women have been reported in previous studies.[20,21]

Although differences in gingivitis and periodontitis were not statistically significant, postmenopausal women showed a comparatively higher prevalence of periodontal disease. Estrogen deficiency may influence periodontal tissues through altered inflammatory responses, impaired collagen synthesis, vascular changes, and decreased tissue repair capacity.[22,23] Furthermore, increased production of inflammatory cytokines such as interleukin-1 and tumor necrosis factor-alpha during estrogen deficiency may contribute to periodontal tissue destruction and alveolar bone resorption.[22,23]

Clinical findings such as xerostomia, halitosis, and fissured tongue were significantly more prevalent among postmenopausal women, which is consistent with previous reports.[24,25] Reduced salivary secretion and mucosal atrophy associated with estrogen deficiency may impair mucosal integrity and epithelial turnover, leading to these clinical manifestations. However, no significant differences were observed for lichenoid reactions, ulcerative lesions, and tobacco pouch keratosis,

suggesting that additional factors such as tobacco use, nutritional deficiencies, systemic diseases, and local irritants may also influence the occurrence of oral mucosal lesions.[24,25]

Poorer oral hygiene practices and reduced utilization of preventive dental services were also observed among postmenopausal women. Many participants sought dental treatment only when symptomatic, which may be attributed to lack of awareness, financial limitations, cultural beliefs, and neglect of oral health during aging.[5,10] These findings highlight the need for greater oral health education and preventive strategies targeted toward menopausal women.

Overall, the present study emphasizes that oral health changes during menopause are multifactorial and influenced by hormonal, biological, psychological, and socioeconomic factors. Postmenopausal women appear more vulnerable to oral health problems and therefore require comprehensive preventive and therapeutic care. Integration of oral health assessment into routine menopausal healthcare, along with regular dental check-ups, oral hygiene education, dietary counseling, and management of xerostomia, may improve quality of life and oral health outcomes. Interdisciplinary collaboration among dentists, gynecologists, and primary healthcare professionals is essential for early diagnosis, prevention, and holistic management of oral health problems in menopausal women.[1,2,6]

Conclusion

The present study demonstrated that postmenopausal women experience a significantly higher prevalence of oral symptoms, psychological disturbances, adverse oral clinical findings, tooth loss, and compromised periodontal health compared to premenopausal women. Xerostomia, halitosis, altered taste, fissured tongue, and poor oral hygiene practices were notably more common among postmenopausal women. These findings highlight the important influence of estrogen deficiency and age-related physiological changes on oral health during menopause.

Menopausal women require increased attention toward preventive oral healthcare, regular dental evaluation, maintenance of oral hygiene, and early management of oral symptoms to improve overall health and quality of life. Integration of oral health assessment into routine menopausal healthcare and interdisciplinary collaboration among dentists, gynecologists, and primary healthcare providers may contribute to early identification and effective management of menopause-associated oral conditions.

Limitations and Future Perspectives

The present study has certain limitations. As the study was cross-sectional in design, causal relationships between menopause and oral health changes could not be established. In addition, the study population was limited to a single institution and specific geographic region, which may restrict the generalizability of the findings to the wider population.

Future longitudinal and multicentric studies involving larger and more diverse populations are recommended to further evaluate the long-term effects of menopause on oral health. Further research should also focus on the role of hormonal factors, salivary biomarkers, bone metabolism, and interdisciplinary preventive strategies in improving oral health outcomes among menopausal women.

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Conflicts of interest: Authors declare no conflict of interests.

Ethical Clearance: The study was designed and implemented following the Declaration of Helsinki, and the protocol was reviewed and approved by the Institutional Ethics Committees of Krishna Vishwa Vidyapeeth Dee,med to beUniversity, Karad, with Ref. No. KVV/ IEC/04/2025; Protocol No:1064/2024-2025.

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