ORAL HEALTH AND EMOTIONAL WELL- BEING OF PREMENOPAUSAL AND POSTMENOPAUSAL WOMEN: A CROSS-SECTIONAL STUDY

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ABSTRACT

Introduction:- Menopause is important physiologic stage in every women's life. The menopausal transition can mean changes in health and well-being with women reporting physical discomfort, sleeplessness, vasomotor symptoms, muscle and joint problems, depressive mood, physical and mental exhaustion. During this phase, increased severity of periodontal conditions and emotional imbalances has been observed. Hence this study investigates relationship between periodontal health and concomitant physical and emotional symptoms in postmenopausal women (PMW), with regularly menstruating premenopausal women (RMPW).

Objectives:- To investigate the relationship between clinical periodontal health and physical, emotional symptoms extracted by Women's Health Questionnaire (WHQ) scores, in

postmenopausal women (PMW), in comparison with regularly menstruating premenopausal women (RMPW).

Methods:- This cross-sectional study was conducted among 120 women visiting OPD in K.D Dental College & Hospital, aged between 35-65 years, periodontal diagnosis was made according to the 2017 classification for periodontal and gingival diseases and emotional well-being was assessed with Women's Health Questionnaire.

Results: - Mean age of participation in RMPW group was 37.75±5.45 years and the mean of PMW group was 51.40±7.90 years. The mean of missing teeth in RMPW group was 0.77±1.23 and mean for PMW group was 2.23±2.11, 54(45%) subjects were healthy and 66(55%) had gingivitis. 48(72.7%) subjects has moderate periodontitis and 18(27.3%) had severe stage of periodontitis.

Conclusion:- A relatively greater difference was found in periodontal severity, missing number of teeth, plaque index between perimenopausal and postmenopausal women although, the oral care habits were similar among both study groups. Depressive, somatic, anxiety/ fear and sleep problem symptoms during the menopausal transition were reported more among PMW group, unlike memory related symptom which was found to be experienced equally among study groups.

Keywords: Menopause, Oral health, Periodontitis, Emotional well- being, Women

INTRODUCTION

There are several stages in a woman's life where changes in hormone levels make them more susceptible to oral diseases, including during menstruation, pregnancy, and menopause [1].

Menopause is another important stage in every women's life as they undergo one of the final hormonal change of womanhood [2]. Menopause is defined as a physiologic process occurring in women in the fifth decade of life involving permanent cessation of menstruation. Menopause is a gradual process occurring over an extended period of time with interruptions of 1 to 3 months. According to World Health Organization (WHO) consecutive months of amenorrhea, for which there is no other obvious pathological or physiological cause, is considered to be natural menopause. Recent studies have reported that most women take 2 to 6 years to reach menopause while some can take about 8 years [3].

Periodontal disease can be explained as a microbial infection which is multi-factorial [2] and comprises of both gingivitis and periodontitis. Gingivitis is an inflammatory condition of the soft tissues surrounding the teeth. In the menopause phase, a fluctuating hormone level is observed which causes an estrogen deficiency [2].

The gingival epithelium becomes thinner, atrophic and more prone to inflammatory changes, on the other hand, salivary flow rate decreases and salivary composition may be altered, contributing to the development of several oral conditions [4].

The perimenopausal phase is the menopausal transition period that spans the last few years prior to the last menstrual period and ends 12 months after; this phase can last from 4–10 years, often referred to as climacteric, a period of crucial physical, emotional and psychological changes in a woman's life. The postmenopausal phase begins approximately 12 months after menopause. The transitional period before menopause can be psychologically traumatic and confusing because there is sadness regarding the loss of reproductive ability; however, a simultaneous feeling of being free from the monthly routine and finding a new status toward maturity is experienced [5].

This transition can mean changes in health and well-being with women reporting physical discomfort, sleeplessness, and embarrassment, and many symptoms such as vasomotor symptoms (hot flushes and night sweating) which can lead to dyspareunia. The most frequently observed symptoms were muscle and joint problems (80%), depressive mood (73.5%), physical and mental exhaustion [6].

The Women Health Questionnaire (WHQ) was designed to assess symptom perceptions during the menopause transition for older postmenopausal women, within the age range (45±65 years) with vasomotor symptoms and vaginal dryness, menstrual and age-related bodily changes, sleep patterns, sexual behaviour, physical health are prevalent. The questionnaire does not measure the presence of specific diseases nor the impact of health problems upon functioning, it does not make assumptions about the nature of menopausal symptoms. However, it can be used as part of a quality of life assessment and in the evaluation of interventions and preventative strategies for mid-aged and older women [7].

The available literature reveals an insufficient data in this region to understand the oral health trends during pre and postmenopause phase of womanhood. Hence the present study aims to investigate the relationship between periodontal health and concomitant physical and emotional symptoms extracted by Women's Health Questionnaire (WHQ) scores, in postmenopausal women (PMW), in comparison with regularly menstruating premenopausal women (RMPW) visiting the dental OPD in K. D Dental college, Mathura, Uttar Pradesh.

MATERIALS AND METHOD

This cross-sectional study included 120 women selected by random sampling with

an age range of 35–65 years, conducted between November –December 2022 at department of Oral Medicine and Radiology, K. D Dental College & Hospital. Ethical clearance was obtained from institutional ethical committee and a written informed consent was obtained from the study subjects after informing the purpose of the research. The sample size was estimated using G-power software with statistical significance between the two groups for 0.05, type-I error and 80% power with a medium effect significant (d=0.05). The study population comprised of two main groups (n= 60 each); postmenopausal women (PMW) and regularly menstruating premenopausal women (RMPW). A total of 120 participants were selected to compensate for the maximum permissible error and increase the accuracy of the study. Pilot study was performed on 20 participants; 10 each for postmenopausal women (PMW) and regularly menstruating premenopausal women (RMPW).

Inclusion criteria:

1. The subjects in the PMW group were included if they were under 65 years of age.
2. Subjects with a history of spontaneous amenorrhea within the last 12 months.
3. The subjects in the RMPW group were included if they were above the age of 35 years, without any irregularity in their menstrual cycles within the past 12 months.
4. All subjects having at least 10 natural teeth without any prosthetic restoration.

Exclusion criteria:

1. Subjects on antibiotics within the last 3 months.
2. Subjects who went through menopause after a medical attempt.
3. Subjects who had an ongoing cancer therapy or diabetes.

Periodontal examination:

A total of 120 women who fulfilled the inclusion criteria and gave written consent were asked to record standardized questionnaire to acquire demographic data, self-reported systemic health history, age (years) at the visit and at menopause, oral care habits, any number of missing teeth, frequency of dental visits, education, and marital status prior to periodontal examinations. The following periodontal parameters were recorded with six surfaces per tooth: probing depth (PD), gingival recession (GR), bleeding on probing (BOP), and plaque index (PI) **[1]**.

Women's Health Questionnaire: The Turkish version of the Women's Health Questionnaire (WHQ), attained from https://eprovide.mapitrust.org and previously validated.[7] was used. The proforma was recorded after periodontal examination. This questionnaire developed

to assess a mid-aged woman's short-term well-being in nine sections; depressed mood, somatic symptoms, vasomotor symptoms, anxiety/fears, sexual behavior, sleep problems, menstrual symptoms, memory/ concentration, and attractiveness with a total of 37 questions. The sections "menstrual symptoms", "attractiveness", "sexual behaviour" and "vasomotor symptoms" were excluded during evaluation due to unanswered questions. The answers to the questionnaire were defined as 'Yes, definitely', 'Yes, sometimes', 'No, not much' and No, not at all'. However, the calculation is based on binary scoring as 0 or 1, instead of a 4-point score. Every question took a score of 0 or 1. The sum of the scores was divided by the number of questions and each section was scored between 0–1. Scores approaching 1 indicated that the individual experienced symptoms related to a particular domain more prominently **[1]**.

The questionnaire was explained to all subjects in Hindi language and responses were recorded to those questions as per the understanding ability of participants. The questionnaire took approximately 10-15 minutes to complete.

All the subjects were motivated towards practising a daily toothbrushing following an appropriate brushing technique so as to spread awareness about the importance of oral hygiene maintenance.

STATISTICAL ANALYSIS

The data collected was tabulated into MS Excel spreadsheet and analyzed using IBM SPSS statistical software, version 25.0. Independent t- test was used for the mean of women participating in both the groups, mean of missing teeth, mean plaque index and women health questionnaire scores among both the study groups. Pearson's chi square test was used for education, occupation status and differences in the periodontal severity, oral care habits of study subjects in both groups. $p \leq 0.05$ was considered to be statistically significant.

RESULTS

The mean age of menopause among the PMW group was 49.37 ±6.89 years. The mean age of participation in RMPW group was 37.75±5.45 years and of PMW group was 51.40±7.90 years. Majority 87(72.5%) subjects attained primary education and 33(27.5%) attained high school. Few 11(9.2%) subjects were employed and majority 109(90.8%) were unemployed. In RMPW, 40(66.7%) and in PMW, 47(78.3%) brushed once daily **(Table- 1.a)**. Only 20(33.3%) subjects in RMPW group visited dentist more than twice over a dental complaint and in PMW group, few 16(26.7%) visited more than twice over a complaint **(Table- 1.b)**. The mean of missing teeth for RMPW group was 0.77±1.23 and for PMW group was 2.23±2.11. **(Table- 2)** The mean plaque

index was 0.54 ±0.39 for RMPW and was 0.9±0.54 for PMW. **(Table-3) Regarding** periodontal status 54(45%) subjects were healthy and 66(55%) had gingivitis **(Table-4.a)** with 48(72.7%) subjects having moderate periodontitis and only 18(27.3%) had severe periodontitis. **(Table-4.b)** Statistical significance was seen for mean of responses to Women Health Questionnaire on depressed mood, somatic symptoms, anxiety/ fear, memory related questions and sleep problems (p<0.05) **(Table-5)**.

Table 1: Distribution of study groups according to oral care habits

a-Tooth brushing	Group-1 (RMPW)	Group-2 (PMW)	Total	Chi value	p-value
Once a day	40 66.7%	47 78.3%	87 72.5%	2.048	0.152
Twice a day	20 33.3%	13 21.7%	33 27.5%		
Total	60 100.0%	60 100.0%	120 100.0%		

Pearson's chi- square test, p>0.05 insignificant

b- Dental visits/ year	Group-1 (RMPW)	Group-2 (PMW)	Total	Chi value	p-value
Once in a year	20 33.3%	27 45.0%	47 39.2%	1 .730	0.421
Twice in a year	20 33.3%	17 28.3%	37 30.8%		
More than twice in a year	20 33.3%	16 26.7%	36 30.0%		
Total	60 100.0%	60 100.0%	120 100.0%		

Pearson's chi- square test, p>0.05 insignificant

Table 2: Mean of missing teeth among study groups

Group	Mean age	Std. Deviation	Mean difference	p-value
Group-1 (RMPW)	0.77	1.23	-1.53	<0.001**
Group-2 (PMW)	2.23	2.11		

Independent t- test, **p<0.001 highly statistically significant

Table 3: Mean plaque index among study groups

Group	Mean PI	Std. Deviation	Mean difference	p-value
Group-1 (RMPW)	0.54	0.39	-0.38	0.000***
Group-2 (PMW)	0.92	0.54		

Independent t test, ***p<0.001 highly statistically significant

Table 4: Periodontal status among study groups.

a-Condition	Group 1 (RMPW)	Group 2 (PMW)	Total	Chi value	p-value
Healthy	44 73.3%	10 16.7%	54 45%	54.562	<0.001**
Gingivitis	16 26.7%	50 83.3%	66 55%		
Total	60 100.0%	60 100.0%	120 100.0 %		

Pearson's chi- square test, **p<0.001 highly statistically significant

b- Stage of periodontitis	Group 1 (RMPW)	Group 2 (PMW)	Total	Chi value	p-value
Moderate	13 81.3%	35 70%	48 72.7%	36.548	<0.001**
Severe	3 18.7%	15 30%	18 27.3%		
Total	16 100.0%	50 100.0%	66 100.0%		

Pearson's chi- square test, ᵖ*p<0.001 highly statistically significant

Table 5: Distribution of responses to Women Health Questionnaire among study groups

	Group 1 (RMPW) Mean±SD	Group 2 (PMW) Mean±SD	p-value
1. Depressed mood	0.80±0.40	0.93±0.25	0.032*
2. Somatic symptoms	0.65±0.48	0.930.25	<0.001**
3. Anxiety/ fears	0.730.44	1.000.00	<0.001**
4. Memory	0.87±0.34	0.92±0.27	0.382
5. Sleep problems	0.95 0.22	0.450.50	<0.001**

DISCUSSION

Pre- menopausal and post- menopausal phase is a physiological process associated with many functional and compositional alterations in almost all systems of the body to varying extents including oral cavity [12]. In our study, the mean participation age for RMPW group was 37.75±5.45 years and PMW group was 51.40±7.90 years which was in accordance to the study conducted by Yakar *et al* [1], wherein the participants' mean age was 54±5 years in the PMW group and 41±4 years in the RMPW group. Ricardo Alves *et al* [4], in their study showed an average age of the menopausal women to be 61.15 ± 8.01 years and pre-menopausal women to be 44.79 ± 5.23 years. The findings of our study were contrasting to findings of study conducted by Pitu Wulandari *et al* [9], in which mean perimenopausal age was 47.33±2.49 years

and that of postmenopausal women was 53.92±3.76 years. This corresponds to the minimum age of 45 years; the age at which follicular cells, which are a measure of ovarian function, begin to degenerate [9]. The mean age of menopause in our study among the PMW group was 49.37±6.89 years which was in contrast to study by Yakar *et al* [1] the menopausal age was 46±4 years; 51.10 ± 4.62 years in a study conducted by Nikita *et al* [2] and 65.4 ± 7.6 years in a study by Mei-Yu Pan [6]. Our findings revealed 40(66.7%) women from RMPW group and 47(78.3%) women of PMW attained primary education which was contrasting to findings of study conducted by Yakar *et al* [1] in which 6 (10.2%) RMPW and 17 (30.4%) PMW group attained primary education. Similarly, in a study conducted by Ricardo Alves *et al* [4], the elementary education among

menopausal group was 51(75.0%) and was 13(38.2%) among premenopausal women. Our results showed that majority 59(98.3%) of RPMW and 50(83.3%) in PMW group, were unemployed which was in contrast to a study conducted by Jennifer Whiteley et al [13] in which, 2144 (45.7%) pre-menopausal women and 1556 (37.8%) among menopausal group were unemployed.

The present study found a statistically insignificant result (p=0.152) in oral hygiene care habits between perimenopausal and postmenopausal women which is in accordance to study conducted by Nik Yakar et al [1] in which a statistically insignificant result was obtained for both the study groups (p= 0.623), similar to findings of study conducted by Nikita Sivakumar et al [2] which showed no difference in oral hygiene level in both groups of women. In our study, among PMW, 47(78.3%) brushed once in a day which was consistent with findings of study conducted by Ricardo Alves et al [4] in which 14(20.6%) menopausal women brushed once per day. A statistically insignificant result was obtained in our study for dental visits over a complaint (p =0.421) which was in accordance to study conducted by Nik Yakar et al [1] in which similar results were obtained for both the study groups (p= 0.522). A similar result was found in a study conducted by Ricardo

Alves et al [4] with a statistically insignificant result (p<0.05).

We found mean number of missing teeth among RMPW group was 0.77±1.23 and mean for PMW group was 2.23±2.11 (p<0.001) which was in accordance to the study conducted by Nik Yakar et al [1] in which the number of missing teeth for RMPW was 2.14±2.43 and for PMW was 3.88±2.41 (p=<0.0001). In contrast to our study, results by Ricardo Alves et al [4] showed missing number of teeth among pre-menopausal group 6.8±4.7 and post menopausal group was 10.8 ± 5.9 (p < 0.01). Mean plaque index of RMPW group was 0.54 ±0.39 and for PMW group was 0.9±0.54 (p= 0.000). Inconsistent results were found in study conducted by Nikita Sivakumar et al [2] which showed mean 1.12±0.55 in perimenopausal group and 0.10±0.55 in post-menopausal group (p=0.89) with similar findings in a study by Pitu Wulandari et al [9], wherein the mean among RMPW was 1.12 (± 0.55) and PMW was 1.10 (± 0.53); (p=0.89). Similar findings were seen in a study conducted by Ricardo Alves et al [4] wherein the mean PI was 40.08 ± 20.24 among pre-menopausal women and 51.41 ± 20.69 among post-menopausal women (p <0.01). Among RMPW group, only 16(26.7%) and PMW group, 50(83.3%) were found to have gingivitis (p= <0.001) which was in contrast to study conducted by Nil Yakar et al [1] in

which 32(57.1%) among PMW group and 37(62.7%) RPMW had gingivitis (p= 0.42). In our study among total 60(100%) subjects in RMPW group, 13(81.3%) had moderate periodontitis and only 3(18.7%) had severe stage of periodontitis. Among 60(100%) subjects in PMW group, 35(70%) had moderate stage of periodontitis and 15(30%) had severe stage of periodontitis (p<0.001) which was consistent to the findings of study conducted by Nil Yakar *et al* [1] only 12(21.4%) women had moderate periodontitis in PMW group and 8(13.6) in RMPW. In PMW group, 10(17.8%) has severe periodontitis and 11(17.5%) in RPMW. (p=0.73)

Our study is further unique in utilizing a validated instrument to measure the impact of menopausal symptoms on health-related impairment, which enabled us to quantify the emotional burden of emotional symptoms [13]. Although oral health-related quality of life is a widely studied subject in the general population and also in postmenopausal women, to the best of our knowledge no previous study used the WHQ to assess the link between the quality of life scores and periodontal health [1]. Among study groups, the mean for questions on depressed mood among RPMW group was 0.80±0.40 and for PMW group the mean was 0.93±0.25 (p=0.032) which was in contrast to study conducted by Nil Yakar *et al* [1] depressed mood mean for PMW was

0.26±0.21 and for RMPW was 0.21±0.16 (p=0.146). Another study conducted by Jennifer Whitely *et al* [13] showed prevalence (32.5%) of depression among women who experienced menopause. Questions on somatic symptoms among RPMW group, showed a mean 0.65±0.48 and 0.93±0.25 of PMW group (p<0.001) which was in contrast to study conducted by Nil Yakar *et al* [1] wherein the mean for PMW group was 0.46±0.25 and for RMPW 0.31±0.23 (p= 0.002). The mean for questions on anxiety/ fear among RPMW group was 0.73±0.44 and 1.00±0.00 for PMW group (p<0.001) which was in contrast to study conducted by Nil Yakar *et al* [1] in which the mean for PMW group was 0.27±0.26 and for RPMW was 0.23±0.26 (p=0.484). Another study conducted by Jennifer Whitely *et al* [13] showed prevalence (36.3%) of anxiety among women who experienced menopause. Questions on memory, showed a mean 0.87±0.34 among RPMW and 0.92±0.27 for PMW group (p=0.382) which was in contrast to study conducted by Nil Yakar *et al* [1] which showed mean for RMPW was 0.33±0.35 and 0.39±0.35 PMW group (p= 0.416). Another study conducted by Jennifer Whitely *et al* [13] reported prevalence (49.5%) of forgetfulness among women who experienced menopause. The mean for questions on sleep memory among RPMW group was 0.95±0.22 and for PMW

group the mean was 0.45 ± 0.50 (p<0.001) which was inconsistent to findings of study conducted by Nil Yakar *et al* [1] in which, the mean for PMW group was 0.47 ± 0.35 and for RPMW was 0.28 ± 0.33 (p=0.005). Another study conducted by Jennifer Whitely *et al* [13] reported prevalence (60.1%) of insomnia among women who experienced menopause.

CONCLUSION

A relatively greater difference in periodontal severity, missing number of teeth, plaque index between perimenopausal and postmenopausal women although the oral care habits were similar among both study groups. The oral/ periodontal and physiologic health of a women in pre menopausal and menopausal era are interlinked. The current study highlights information suggesting that depressive symptoms, somatic, anxiety/ fear and sleep problem symptoms during the menopausal transition were reported more among PMW group, unlike memory related symptom which was found to be experienced equally among study groups.

LIMITATIONS

Radiographic assessment of bone mineral density (postmenopausal osteoporosis and osteopenia) was not considered in our study that leads to changes in dental health with faster loss of teeth; however, tooth loss holds a complex aetiology, reflecting cumulative conditions of oral health over time. Our study lacked the account of estrogen hormone deficiency, which can be further conducted as it is one among the factors contributing in periodontal damage We have made comparison with studies conducted over the globe and not specifically undertaken upon Indian women, however the results were largely identical. Hence, the study cannot be generalised.

SUGGESTION & RECOMMENDATIONS

Importance of preventive dentistry increases with aging of women. Further studies to assess the alarming periodontal health more precisely by recording radiological examination of bone mineral density for thorough knowledge of decreasing bone mineral content and bone loss among the study subjects would be more accurate. Dentists, gynecologists and physicians should work together for the management of oral, physical and psychological problems associated with menopause. On a broader profile, additional multi-centered, larger follow-up studies are needed as oral health trends in premenopausal and post menopausal women could not be identified.

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CONFLICT OF INTEREST

Authors declare that there are no conflicts of interest.

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