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## Comparison of Pre- and Post-Menopausal Women's Oral Health Status in Erbil City

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### Abstract

**Background:** The aims of the study are comparing pre- and post-menopausal oral health status of group of women in Erbil city by examining a range of oral health parameters (plaque, gingival, calculus, and DMFT indices) with number of risk factors and risk indicators of periodontal disease, behavioral and systemic factors.

**Materials and Methods:** 150 randomly selected women (75 female premenopausal, 75 female postmenopausal) were enrolled in the study attending different private and public dental clinics seeking various dental treatment. Plaque index by l oe and silness was used to assess plaque deposition on teeth, calculus index by Ramfjord was used to assess calculus deposition on teeth, gingival index by l oe and silness to evaluate gingival health and DMFT index by WHO basic oral health surveys to assess decayed, missing, and filled permanent teeth, also with many risk factors and risk indicators affecting women's oral health status.

**Results:** Revealed higher mean of clinical parameters (plaque, gingival, calculus, and DMFT) in postmenopausal women compared to the premenopausal group with significant difference for DMFT and plaque index at 0.037, 0.084 respectively, and non-significant difference for gingival and calculus indices with increasing risk factors and indicators for postmenopausal group compared to premenopausal group that affect women's oral health status for the variable: marital status, number of pregnancy, educational level, not brushing teeth, and systemic diseases.

**Conclusion:** Increased clinical parameters with increasing risk factors and indicators in postmenopausal group affect women's oral health status compared to premenopausal lead to increasing importance of preventive dentistry with aging women for the practicing dentists and obstetricians.

**Keywords:** Premenopausal; Postmenopausal; Risk Factors; Risk Indicators

## Introduction

The dynamic process of menopause continues to captivate the scientific community, with growing evidence suggesting its multifaceted impact on various physiological systems including heart diseases, urogenital complications, aging of skin, and osteoporosis [1,2]. One of these physical systems is oral cavity which is a crucial gateway to overall health [3,4]. It's unclear whether these impacts are time dependent as their frequencies increase with advancing age or whether hormonal changes associated with these female life cycle's changes are responsible for these oral conditions [2].

These fluctuations of female steroid hormones such as progesterone and estrogen during females' reproductive life cycle starting from puberty, peaking in pregnancy and persisting up to and after menopause can impact the oral cavity like swollen gingiva due to increased blood flow to the gums [5]. Also, these hormonal changes may affect the body's response to bacterial plaque, potentially increasing the risk of periodontal disease, also these changes can lead to changes in saliva production, resulting in dry mouth which contributes to an increased risk of tooth decay and oral discomfort [6,7], also some women may experience the development of oral lesions such as canker sores, tooth mobility due to the effect of these hormonal changes on periodontal ligaments around the teeth [8,9].

The oral cavity is not immune to the impact of these hormonal shifts and understanding how menopause influences, oral health is crucial for maintaining overall well-being in aging women [10].

Oral health is very important health problem during pre- and post-menopausal widespread an endemic in most population [11,12].

By assessing a wide range of oral health parameters including periodontal health and dental caries, number of risk factors and risk indicators for periodontal attachment loss, behavioral and systemic factors in pre and postmenopausal women.

## Aims of the Study

- To provide an updated comprehensive comparison of women's oral health status before and after menopause in Erbil city, by examining a range of oral health parameters such as periodontal health and dental caries (PI, GI, CAL Indices, and DMFT), number of risk factors and risk indicators for PD disease, behavioral, and systemic factors, we seek to gain deeper insights into the potential connections between menopause and oral health of women in Erbil city, Iraq.

- This research is poised to contribute significantly to the growing body of knowledge surrounding women's health and the intricate connections between systemic health and oral health as this topic hadn't been studied in Erbil city according to our best of knowledge.
- As we delve into the intricacies of menopause related changes, we aim to explore not only the traditional aspects of oral health but also delve into novel factors that may contribute to oral health disparities during this life phase.
- We aim to foster a comprehensive approach to women's health that embraces oral health as an integral component by illuminating the pathophysiological changes occurring in oral cavity during menopause.

## Materials and Methods

150 women who were attending various private and public dental health centers in Erbil city for the purpose of seeking various dental treatment were randomly selected and enrolled in the study. They were divided into 2 groups according to their age.

- Group 1: Age 20-45 years old premenopausal period
- Group 2: Age 46-61 years old postmenopausal period

A questionnaire including formation concerning age, marital status, educational level, number of pregnancies, brushing or not, frequency of brushing, dental visits whether its regular or irregular, knowledge toward causes of dental caries and periodontal diseases, medical history if there is any systemic or hereditary disease and type of medicines they take and tongue burning sensation. The consent form for each patient was obtained to explain the aim of the study.

### Inclusion criteria

Any female attending the clinic with an age range 20-61 years old with sufficient knowledge about the related aspects of this research to fill the questionnaire.

### Exclusion criteria

- Any female who can't fill the questionnaire.
- Any female younger than 20 years old.

Clinical examination was carried out on a dental chair using sharp sickle-shaped probe, dental mirror for detection of dental caries, WHO periodontal probe was used for detection of dental plaque, calculus and gingival health.

Plaque, calculus indices were used to assess plaque and calculus depositions on the teeth according to l oe silness and Ramfjord [13,14] while gingival index was used to evaluate gingival health [15]. DMFT index was used for assessing decayed, missing, and filled teeth [16].

Statistical analysis were performed using (SPSS) statistical package for social sciences version 25 using frequency distribution as percentages using “t” test comparing of 2 groups, significance level was set up at p < 0.05 level and highly significant at p < 0.01.

**Results**

Sample distribution was shown in table 1. Each group comprised 50% of total sample (150) females.

**Table 1:** Distribution of the sample according to group.

Period	Age (year)	No	%
Premenopausal	30-45	75	50%
Post menopause	46-61	75	50%
Total		150	100%

Table 2 illustrated the frequency distribution in(percentages) for both groups regarding the following parameters with highly statistical difference for both groups, the values of postmenopausal group were found to be higher than premenopausal group for marital status, number of pregnancy (grand multipara), educational level (illiterate), not brushing and systemic diseases at p < 0.004,0.000,0.000,0.007,0.007 level respectively.

**Table 2:** Comparison of frequency distribution percentages of study parameters for pre- and post- menopausal groups.

Variables	Premenopausal	Post-menopausal	p-value
Marital status			
Single	29 (% 33.3)	2 (%2.66)	0.2 NS
Married	46 (%61.3)	73 (%97.33)	0.004 **
Total	75(%100)	75(%100)	150(%100)
Number of pregnancy			
Nullipara	31(%41.33)	0	0.000**
Primipara	5(%6.6)	0	0.000**
Bipara	10(%13.33)	2(%2.7)	0.8 NS
Multipara	10(%13.33)	6(%8)	0.000**
Grand multipara	19(%25.33)	67(%89.3)	0.000**
Total	75(%100)	75(%100)	150(%100)

Educational level			
1 illiterate	10(% 13.33)	43(% 57.33)	0.000**
2 primary	16(% 21.33)	18 (% 24)	0.74 NS
3 secondary	25(% 33.3)	9(%12)	0.000**
4 college	24(%32)	5(%6.67)	0.001**
Total	75(%100)	75(%100)	150(%100)
Frequency of tooth brushing			
0	5(%6.6)	4(% 5.33)	0.21 NS
Once	19(%25.33)	31(% 41.33)	0.08 *
Twice	51(% 68)	40(% 53.33)	0.17 NS
Total	75(%100)	75(%100)	150(%100)
Using brushing aid			
Tooth brush	47(% 62.6)	46(%61.33)	0.8 NS
Siwak	4(% 5.33)	1(%1.33)	0.000**
Wooden Dental floss	2(%2.7)	2(%2.7)	0.41 NS
Dental thread	4(%5.33)	3(% 4)	0.19NS
Not brush	2(%2.7)	4(% 5.33)	0.007**
More than once a day tooth brushing	16(% 21.33)	19(% 25.33)	0.60 NS
Total	75(%100)	75(%100)	150(%100)
Visiting dentist			
regularly	51(%73.33)	63(%84)	0.13 NS
Irregularly	24(%32)	12(%16)	0.055*
Total	75(%100)	75(%100)	150(%100)
Smoking			
yes	(%5.33) 4	2(% 2.66)	0.007**
no	71(%94.6)	73(%97.33)	0.78 NS
Total	75(%100)	75(%100)	150(%100)
Tongue Burning sensation			
Yes	8(%10.66)	9(%12)	0.08*
no	67(%89.33)	66(%88)	0.89 NS
Total	75(%100)	75(%100)	150(%100)
Systemic disease			
Yes	4(%5.33)	20(%26.66)	0.007**
no	71(%94.66)	55(%73.33)	0.042*
Total	75(%100)	75(%100)	150(%100)

NS = non significant, \*= significant, \*\* = highly significant.

Also highly statistical difference was found between both groups but the values of premenopausal group were found to be higher for the following parameters: number of pregnancy (nullipara, primipara, multipara), educational level(secondary and college), siwak, smoking at  $p < 0.000, 0.000, 0.000, 0.000, 0.001, 0.000, 0.007$  respectively.

A statistical significant difference was reported for frequency of tooth brushing (once) and tongue burning sensation with higher values for postmenopausal compared to premenopausal at  $p < 0.08, 0.08$  level respectively, while statistical significant difference was reported for visiting dentist (irregularly) and No systemic diseases with higher values for premenopausal group compared with postmenopausal at  $p < 0.055, 0.042$  level respectively.

According to frequency of tooth brushing, premenopausal group (51,68% female) reported that they brushed their teeth twice daily while (40,53.33% female) of postmenopausal brushed their teeth twice daily with NON significant difference.

In relation to brushing aids, most of pre- and post-menopausal females were using tooth brush and dentifrice (47,62.6%), (46,61.33%) respectively with NON significant difference between them.

Also the same figure for visiting dentist regularly, NON smoker, NO tongue burning sensation were reported for both groups with NON statistical significant difference between them.

**Table 3:** Comparison of frequency distributions (percentages) of both groups awareness of the causes of dental caries.

Variables	Premenopausal	Menopausal post	p- value
Eating sugar	30(%40)	30(%40)	1 NS
Not brushing	24(%32)	6(%8)	0.000**
Hereditary Diseases	2(%2.6)	0	0.000**
dont know	5(%6.6)	21(%28)	0.0002**
More than one cause	14(%18.66)	18(%24)	0.504 NS
Total	75(%100)	75(%100)	150(%100)

Ns = non significant, \*\* = highly significant

Concerning table 3, when participants were asked what were the common causes of dental caries, most of them had replied that (eating sugar) and (more than one cause) with NON statistical significant difference between them, whereas among the other variables such as Not brushing, hereditary diseases and don't know, there was a highly statistical significant difference.

**Table 4:** Comparison of frequency distributions (percentages) of both groups awareness of the causes of gingivitis.

Variables	Premenopausal	Premenopausal post	p- value
Not brushing	45(%60)	40(%53.3)	0.53 NS
Hereditary Diseases	2(%2.66)	1(%1.33)	0.08*
Drug	0	4(%53.33)	0.000**
Do not know	28(%37.33)	30(%40)	0.78 NS
Total	75(%100)	75(%100)	150(%100)

Ns = non significant, \* = significant, \*\*= highly significant.

Table 4 revealed that majority of both groups’ answers about the cause of gingivitis were: Not brushing, don’t know with NON statistical significant difference but with significant difference for hereditary diseases factor and highly significant difference for using drug for both groups.

For comparison between the two groups regarding the following variables in table (5), results revealed higher mean values for all indices of postmenopausal group compared with premenopausal group with significant difference for DMFT, plaque index and NON significant difference for gingival and calculus indices as shown in figure 1.

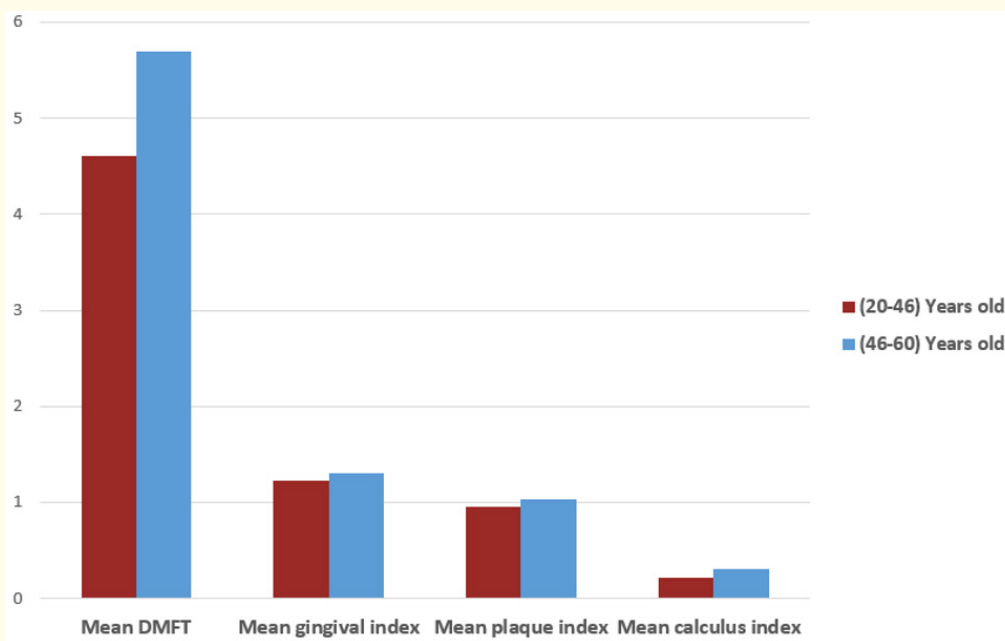
**Discussion**

To the best of our knowledge, the global research landscape on this topic appears relatively sparse, with limited scholarly investigation available, particularly in Kurdistan region, especially Erbil. There seems to be an absence of any studies addressing this matter;

**Table 5:** Comparison of mean values of both groups regarding study variables.

Variables	Premenopausal	Menopausal post	p- value
Mean DMFT	4.6	5.7	0.037*
Mean gingival index	1.23	1.30	0.675 NS
Mean plaque index	0.95	1.03	0.084*
Calculus index Mean	0.21	0.31	0.756 NS

NS = non-significant, \* = significant.



**Figure 1:** Mean values of, DMFT, gingival, plaque and calculus indices of both age groups.

while some studies have been conducted in Baghdad and Mosul cities, focusing on this particular aspect, these offer a potential foundation for comparing and contrasting our findings. Dentists and dental practitioners need to be knowledgeable about menopause and its oral manifestations as a possible risk factor for increasing oral health problems that may result from endocrine disturbances.

As one of the aims of the study was identifying number of risk factors including awareness, behavior toward dental health of pre- and post-menopausal in Erbil city, this study revealed highly significant difference in marital status (73, 97.33%), illiterate education level (43, 57.33%), number of pregnancies (grand multipara) (67, 89.3%) in post-menopausal women compared to premenopausal (46, 61.3%) (10, 13.33%) (19, 25.33%) at p 0.004, 0.00, 0.00 respectively.

Significant difference was reported for once frequency tooth brushing with higher percentage for menopausal 31(41.33%) compared to pre-menopausal 19 (25.33%) at p 0.08 level.

Significant difference was reported for systemic diseases of both gaps (26.66%) (5.33%) respectively at p 0.007 level.

With non-significant difference concerning twice frequency toothbrushing cleaning with toothbrush, regular visits to dentists, non-smoking, tongue burning sensation, this result was in accordance with [18] in Mosul city, concerning their awareness toward the cause of dental caries, a lower percentage of both gaps stated that eating sugar is the most common cause as in table (3) and concerning their awareness toward the cause of gingivitis, nearly half of the sample (40-45%) stated that not brushing is the most com-

mon cause as declared in table (4). So, this emphasizes the concern on motivation to maintain good oral hygiene, regular dental visits with dental health education programs especially during times of hormonal fluctuations to increase their potential knowledge and to address any potential oral health issues. Also, to discuss hormone-related concerns with a healthcare provider can help manage any significant impact on oral health and to prevent any long-term dental issues [11].

According to this study, the comparison between pre- and post-menopausal groups regarding clinical parameters DMFT, plaque, gingival and calculus indices were higher among post-menopausal group as in table (5) and figure 1, this result was in agreement with [19,20] in Baghdad city, and with [17,21] in Mosul city, and with other epidemiological studies in other countries [22-25] that showed the oral hygiene of post-menopausal women was worse than that of the menstruating women [8,19,22,23].

Higher means in oral health status of clinical parameters in post-menopausal women can be declared on the basis of hormonal changes (progesterone and estrogen), decreased immunity and immunoglobulin especially IgA. Thus, the decreased immunity leads to higher plaque deposition, more missing teeth and more dental caries [8,26]. The teeth and gums are extremely susceptible to any hormonal changes that take place just before menopause and decrease body's immunity leading to higher dental caries, plaque, gingival inflammation, more calculus, and PD inflammation [2,27].

Also, pregnancy related changes are most frequent and most marked in gingival tissue, pregnancy does not cause gingivitis but may aggravate pre-existing disease, the effect of pregnancy on the initiation or progression of caries is not clear [7].

There were differences in the level of significance of the clinical parameter of our study compared with Iraqi/Baghdad studies [19,20] and with Mosul studies [18,21], these differences could be attributed to differences in the total number of sample size or due to age differences as it was (48-50-52 years old) in Baghdad studies and (30-61 years old) in Mosul studies compared with our study which includes diverse age range from (20-65 years old). The oral health is a very important problem during pre- and post-menopausal widespread an endemic in most population [12].

There is a marked increase in clinical parameters plaque, gingival, calculus, DMFT indices of post-menopausal women compared

with pre-menopausal one with increased number of risk factors and risk indicators that have direct or indirect effect on women's oral health, this result was in agreement with other epidemiological studies [1,28-31].

## Conclusion

The clinical picture of pre- and post-menopausal oral health should be considered separately from oral diseases. There is an increase importance of preventive dentistry with increasing age in females, it will be a value to the practicing dentists and obstetricians.

## Recommendations

- Regular dental check-up visits maintaining good oral health practices and discussing concerns with a dentist or healthcare providers can help menopausal women manage their dental health during times of hormonal fluctuations to prevent long-term dental issues.
- For all females who are reaching 50 years and above, one of the most important advice to adhere to is to avoid the silent killer by doing a screening test called DEXA scan that has to be done every two years to provide helpful details about osteoporosis (bone loss).

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