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Relationship between Attitude, Behavior and Dental Health of Post-menopausal Woman

Running title: Attitude and dental health of woman.

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ABSTRACT

Aims of study: This study is done to investigate the effect of pre and post menopause on saliva and dental health. Salivary flow rate, pH of stimulated whole saliva, oral hygiene status was determined in regularly menstruating and post-menopausal women.
Materials and methods: The study was carried out on59 post-menopausal women and61 menstruating women selected fromamong the patients who attended the periodontal clinic in College of Dentistry, University of Mosul and other from private clinics. Participants chewed on apiece paraffin for 2 minutes. The saliva secreted spat into a graduated test tube. The flow rate was measured as ml/min. pH strips were used to determine the salivarypH,while gingival index to evaluate the gingival health, calculus, plaque and pocket depth to assess of calculus, plaque deposition according to Silness and Löe, and Ramfjord. While the examination of pocket depth was assessed by using Löe and Silness. Decayed, missing and filled teeth evaluate by DMFT Index.
Results: The study demonstrated that the salivary flow rate decreases after menopause with lower salivary pH. Periodontal and DMFT indices were higher in post-menopausal women when compared to the pre menopause group.
Conclusion: There is a decrease in the salivarypH and flow rate in postmenopausal women which in leads to increased periodontaland DMFT indices.Alsothere is a number of risk factors and risk indicators effect women's oral health.
Key Words: pre – Post menopause, DMFT, Periodontal Index, salivary flow.

INTRODUCTION

Among the most prevalent and preventable chronic health conditions, oral diseases have an immense impact on the oral, general, and reproductive health of women, their quality of life, and the oral health of their children.[(1)]Nearly all women can expect to experience some form of oral disease in their lifetime. In addition to the various genetic, behavioral, and social factors that place individuals at a higher risk of developing oral diseases, biological and physiological changes related to reproductive development, pregnancy, and menopause may also have an adverse impact on a woman's oral health status.[(2)]

During puberty, fluctuations in hormones can make gums more susceptible to gingivitis. As a result, the gums may appear red and swollen, and they can bleed. During menstruation, women who have a tendency to develop canker sores and cold sores may develop a pattern in which these sores recur during every menstrual cycle.[(3)]

Pregnancy is accompanied by changes in the oral cavity that affect the hard and soft tissues of the mouth. ([(4)] During pregnancy, gingivitis may develop. In fact, gingivitis is the most common oral condition associated with being pregnant. Also during pregnancy, the chemical composition of saliva changes, thus reducing saliva's antimicrobial capacity.[(3)]Hormonal changes associated with pregnancy, together with poor oral hygiene, are responsible for the development of gingivitis. Untreated gingivitis can cause periodontitis.[(5,6)]

Most pregnant women change their eating habits to more frequently eat foods rich in carbohydrates and acids. This situation is exacerbated by the decrease in salivary pH associated with frequent nausea and vomiting. Pregnant women who do not comply with regular and careful oral hygiene often suffer from erosions of tooth enamel and develop new dental caries.[(7)]
Menopause in women is a physiological state that gives rise to adaptive changes at both systemic and oral level. Menopause literally means "without estrogen" and is, by definition, the time at which cyclic ovarian function, as manifested by menstruation, ceases. The critical period in which menstruation ceases, defines the term 'Climacterium', which is often used in reference to menopause.[(8)]The median age of menopause is 51.5 years, with a general range of

48-55 years.[9]The hormone changes that take place in menopausal women are responsible for the alterations observed within the oral cavity.[10]

Menopause is accompanied by a number of physical changes, some of which occur in the oral cavity. It is not clear whether these conditions are time dependent, that is their frequency increases with advancing age, or whether the hormonal changes associated with menopause are responsible for these oral conditions.[11]

Some authors suggest that osteoporosis affects oral bones and is a risk factor for periodontal disease and early tooth loss,[12]and other studies have examined the link between decreased skeletal bone mineral density and oral conditions.[13]

It has been shown that estrogen can affect many oral tissues such as salivary glands, temporomandibular joints, oral mucosa and jawbones. Changes in the function of taste buds and neural networks have been noted to occur following menopause.[14]Oral discomfort is found in many menopausal women in addition to general climacteric complaints. The principal pre- and post-menopausal oral symptoms are dry mouth, sensation of painful mouth (PM) due to various causes and less frequently burning mouth syndrome (BMS).Painful oral symptoms have been frequently associated with reduced salivary flow rate.[15]Other potential complications of dry mouth are mandibular dysfunction, diffuse gingival atrophy or oral ulcerations, oral candidiasis, pernicious anemia, etc.[16] Many studies have attempted to relate certain aspects of salivary output and composition to caries susceptibility.[17–19]

The oral cavity and its contained structures are important parts that serve as indicators for general health status of the body. The oral health is very important public health problem during pre-and post-menopausal widespread an endemic in most population.[20]

The aim of this investigation was to review the effects of pre and postmenopause on periodontal tissue, dental caries and saliva. Also to identify a number of risk factors and risk indicators for periodontal attachment loss , dental caries and saliva property including socioeconomic, behavioral and systemic factors.

MATERIAL AND METHODS

Total sample of 120 females were included in this study, females were divided into two groups:

- ✓ Group I: Premenopausal period (menstruation):59 females, with age 30–45 years old.
- ✓ Group II:Postmenopausal period: 61 females, with age 46–61 years old.

The samples were selected randomly from periodontal clinic in College ofDentistry, University of Mosul and other from private clinics.

A questionnaire covering information on age,marital status, number of pregnancies, level of education, brushing or not, used of aids in mouth cleaning, frequency of brushing, dental visits, regularity of dental visits, believes aboutcause of periodontal disease,medical history,tongue burning,use of contraceptive pills,all were recorded for each individual participating in this study.

The clinical examination was carried out in a conventional dental chair by using sterile dental mirrors, sickle shape probes (No.00)to detect dental caries and WHO periodontal probes were used to detect dental plaque, gingival health and pocket depth. The indices used for assessment of oral health the DMFT index to evaluate decayed, missing and filling teeth,[21]while gingival index to evaluate the gingival health, and assess of calculus, plaque deposition, and pocket depth according to Löe and Silness, and Ramfjord.[22-25]

For flow rate and pH salivary sample was carried out 2 hours after breakfast apiece paraffin was chewed for 2 minutes, and the saliva was collected, immediately after that, then measured flow rate by using graduate tubes while pH by using electronic pH meter (Philips) British; PW (9420), by putting electrode of pH meter inside the tube which contain at least 3 ml of saliva; using distilled water and standard solution.[26]

Statistical analyses of data were performed using Statistical Package for Social Sciences (SPSS) version 19.0. Analyses included: Descriptive (Frequency distribution "in percentage", mean and standard deviation), and analytical (t–test to compare between the two groups and Spearman's Correlation to find the correlation between the different variables and parameters measured). Differences were considered as significant when $p \leq 0.05$.

RESULTS

Sample distribution was shown in Table (1). The first group (pre–menopause) comprised 49.2%, while the second group (post–menopause) consisted of 50.8% of the total sample.

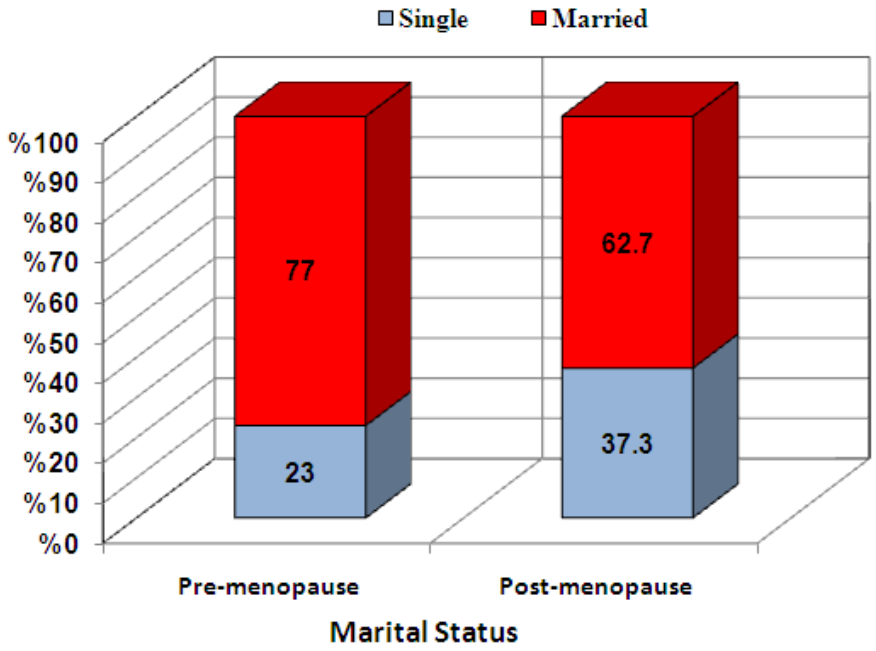
Table 1: Distribution of the sample according to group

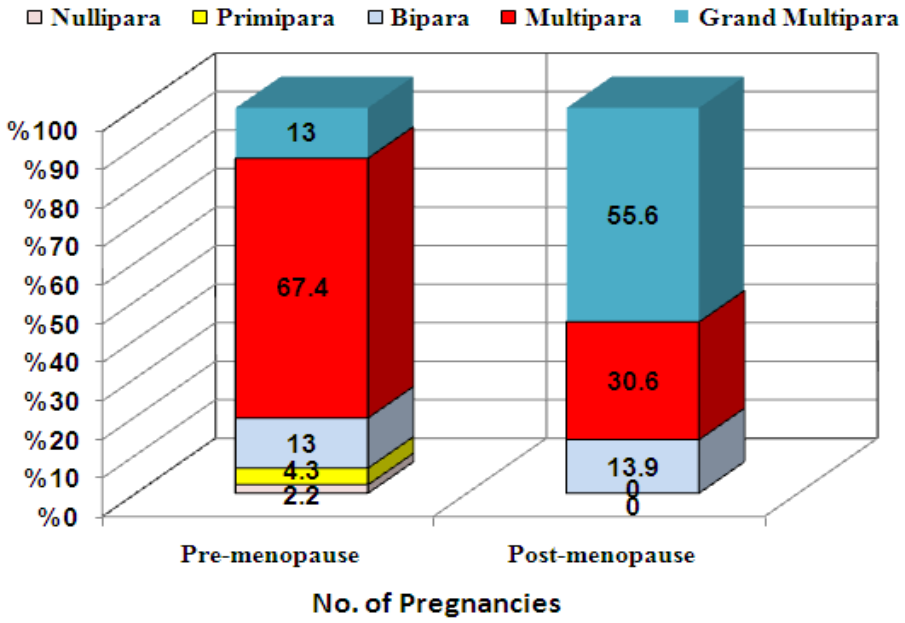
Period	Age (Years)	No.	%
Pre–menopause	30 – 45	59	49.2
Post–menopause	46 – 61	61	50.8
Total		120	100

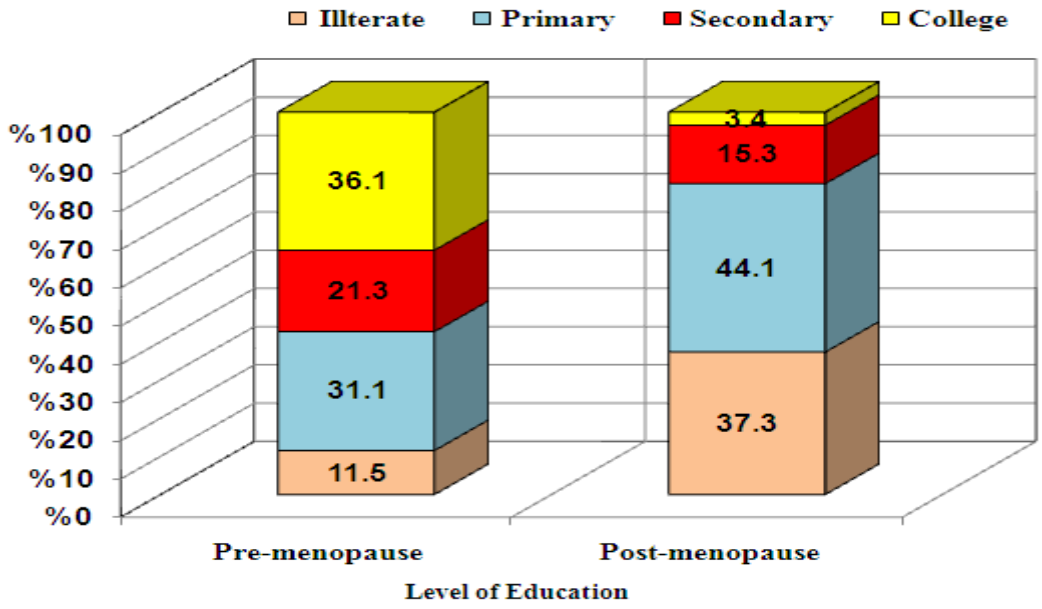
Figures (1–12) illustrated the frequency distribution (in percentage) of the sample for both groups regarding the following parameters: Marital status, number of pregnancies, level of education, brushing, using other aids, frequency of brushing, dental visits, regularity of dental visits, cause of periodontal disease, medical history, tongue burning, and use of contraceptive pills.

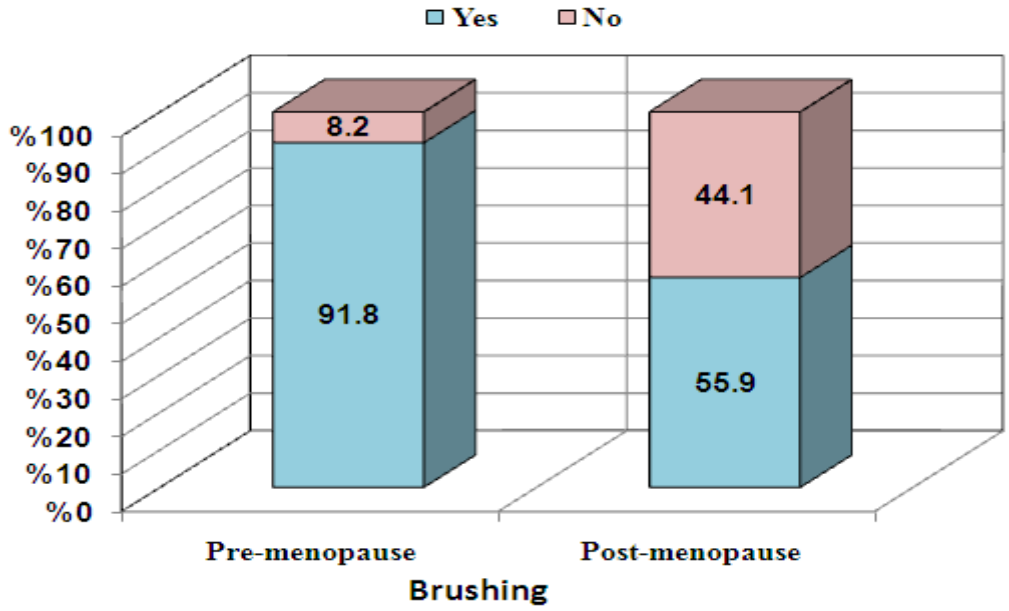
The comparison was made between the two groups regarding the following variables: Plaque index, gingival index, calculus index, pocket depth, DMFT, FR and pH. All the results showed a significant difference between the two groups except those for DMFT and pH.

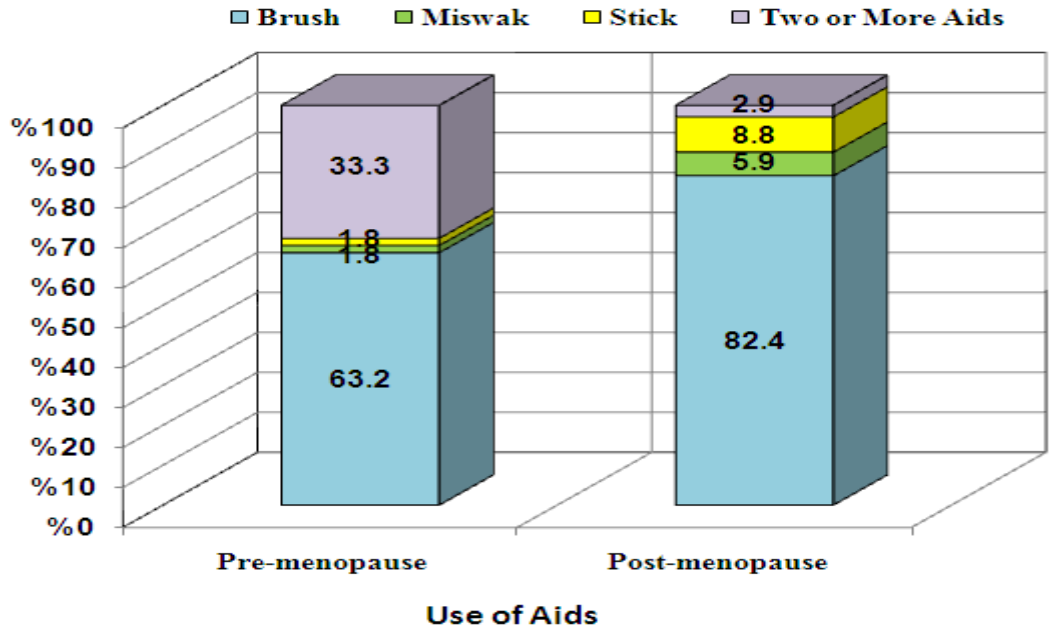
Frequency distribution (in percentage) of the sample for both groups regarding the study parameters (1-12).

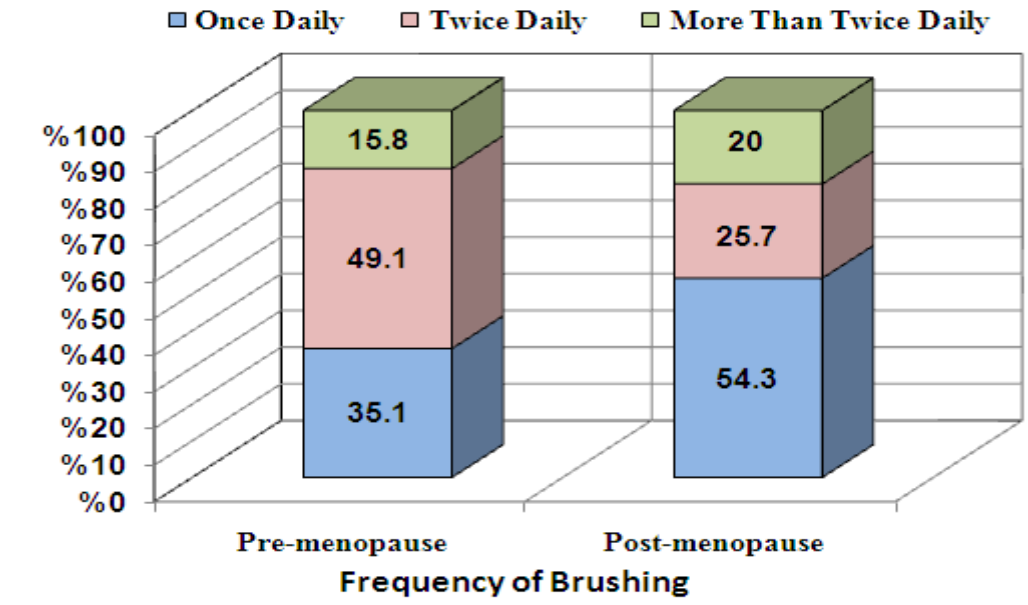




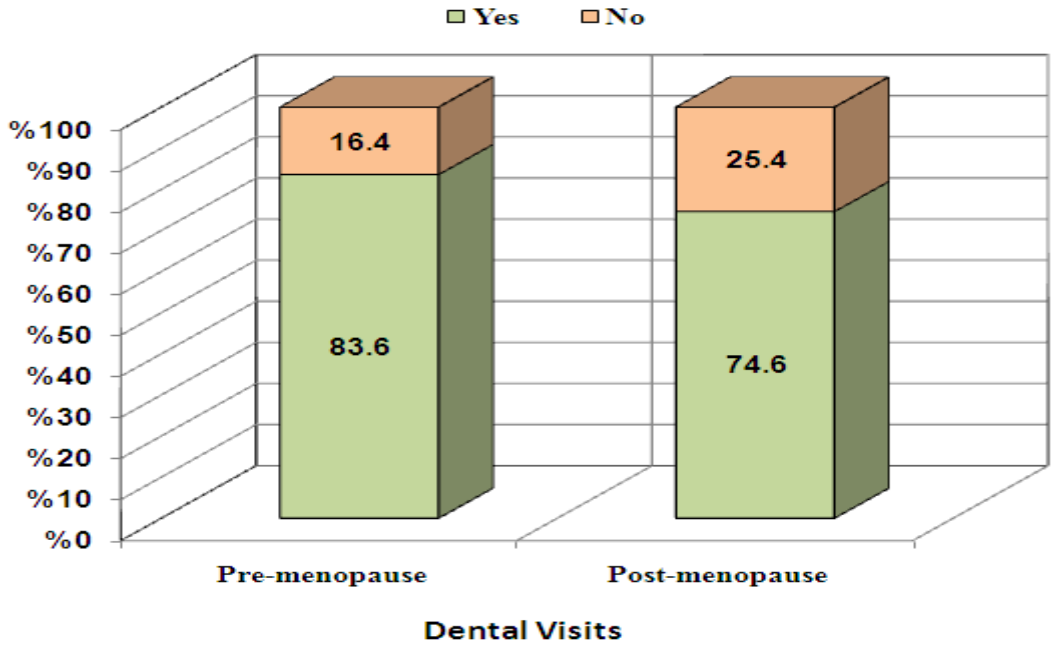

Illterate
Primary
Secondary
College
%100
%90
%80
%70
%60
%50
%40
%30
%20
%10
%0
36.1
21.3
31.1
11.5
3.4
15.3
44.1
37.3
Pre-menopause
Post-menopause
Level of Education


Yes
No
%100
%90
%80
%70
%60
%50
%40
%30
%20
%10
%0
8.2
91.8
44.1
55.9
Pre-menopause
Post-menopause
Brushing

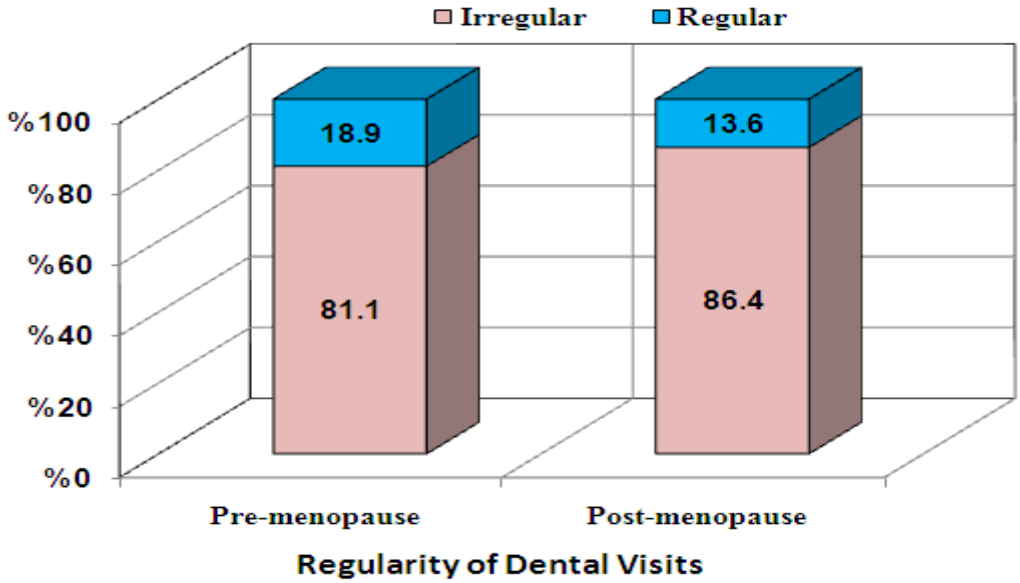

Brush
Miswak
Stick
Two or More Aids
%100
%90
%80
%70
%60
%50
%40
%30
%20
%10
%0
33.3
1.8
1.8
63.2
2.9
8.8
5.9
82.4
Pre-menopause
Post-menopause
Use of Aids



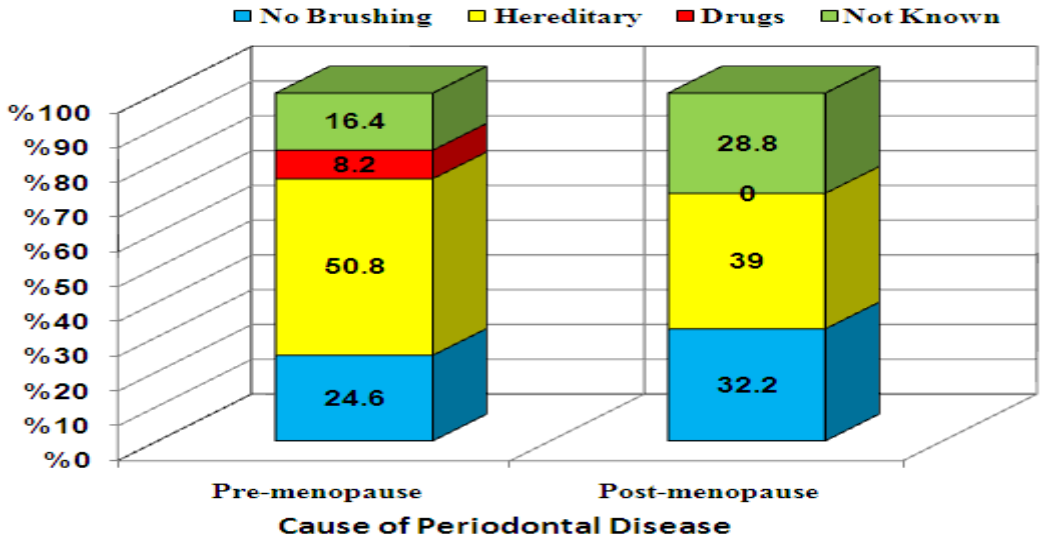
Frequency of Brushing

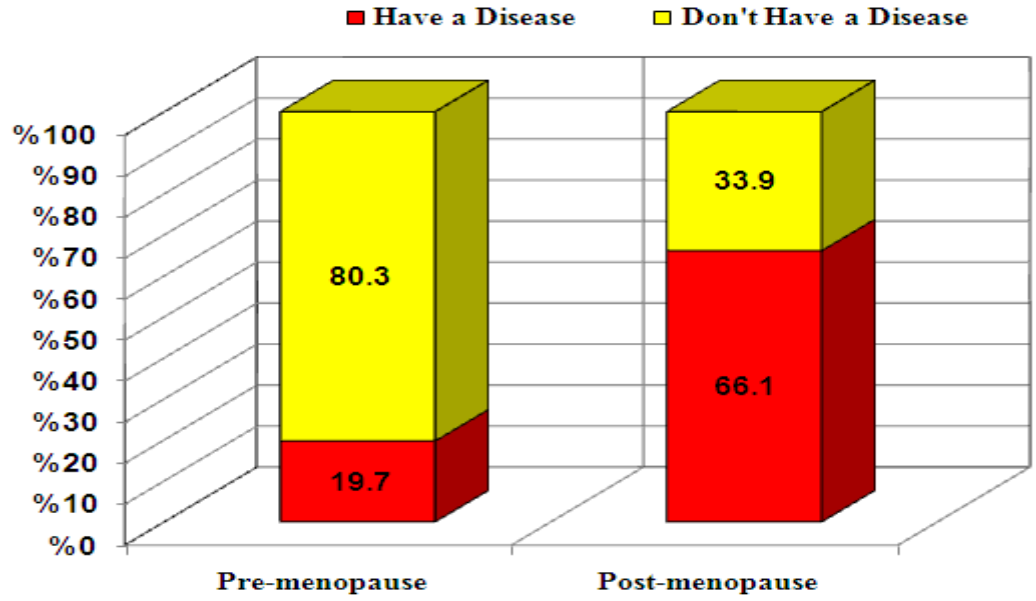


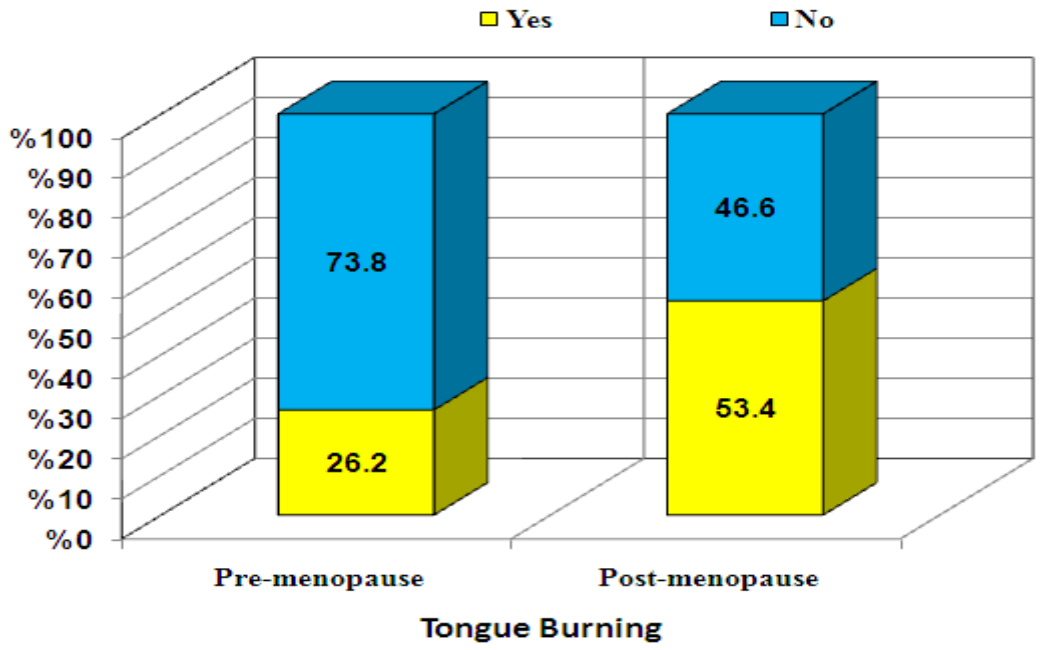
Dental Visits

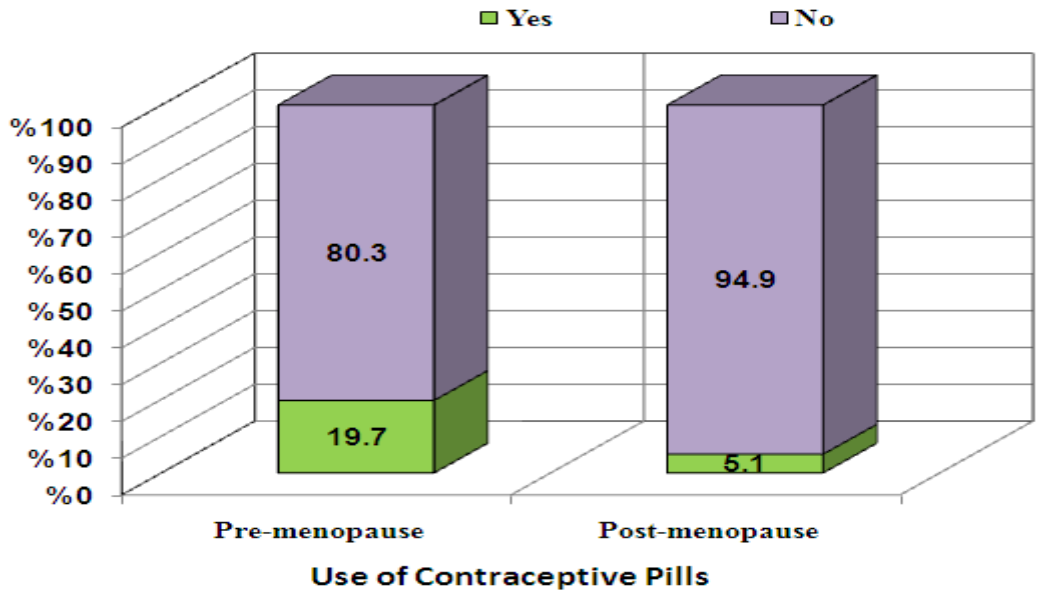


Regularity of Dental Visits


No Brushing
Hereditary
Drugs
Not Known
%100
%90
%80
%70
%60
%50
%40
%30
%20
%10
%0
16.4
8.2
50.8
24.6
28.8
0
39
32.2
Pre-menopause
Post-menopause
Cause of Periodontal Disease


Have a Disease
Don't Have a Disease
%100
%90
%80
%70
%60
%50
%40
%30
%20
%10
%0
80.3
19.7
33.9
66.1
Pre-menopause
Post-menopause


Yes
No
%100
%90
%80
%70
%60
%50
%40
%30
%20
%10
%0
73.8
26.2
46.6
53.4
Pre-menopause
Post-menopause
Tongue Burning



These results were put in Table (2). However, the mean values of the above mentioned variables for the post–menopause group were found to be higher than those for the pre–menopause group.

Table 2: The comparison between the two groups regarding the study variables

Variables	Period	No.	Mean	SD	t–value	df	*p*–value
Plaque Index	**Pre-menopause**	59	1.2608	0.30883	–4.648	118	0.000*
	Post-menopause	61	1.6186	0.51276			
Gingival Index	**Pre-menopause**	59	1.2774	0.36875	–3.449	118	0.001*
	Post-menopause	61	1.5544	0.50297			
Calculus Index	**Pre-menopause**	59	0.4641	0.42082	–4.742	118	0.000*
	Post-menopause	61	0.9220	0.62120			
Pocket Depth	**Pre-menopause**	59	2.975	0.8776	–6.359	118	0.000*
	Post-menopause	61	4.068	1.0020			
DMFT	**Pre-menopause**	59	13.57	5.107	–0.562	118	0.575
	Post-menopause	61	14.05	4.129			
FR	**Pre-menopause**	59	4.287	0.9058	2.560	118	0.012*
	Post-menopause	61	3.863	0.9088			
pH	**Pre-menopause**	59	5.189	1.3545	–0.464	118	0.644
	Post-menopause	61	5.288	0.9568			

* Significant difference existed at 0.05 level.

Table (3 a and b) revealed the correlation among the above mentioned parameters and variables for the first group (pre–menopause). The following correlations were found to be significant: Number of pregnancies vs. gingival index, level of education vs. calculus index and FR, brushing vs. pH, and medical history vs. calculus index.

Table 3a: correlation among the study parameters and variables for the Pre–menopause group.

Parameters	Spearman's Correlation	Variables			
		Plaque Index	**Gingival Index**	**Calculus Index**	**Pocket Depth**
Marital Status	**r–value**	0.112	0.076	–0.114	–0.123
	***p*–value**	0.388	0.563	0.383	0.347
Number of Pregnancies	**r–value**	0.282	0.522*	0.170	0.195
	***p*–value**	0.058	0.000	0.258	0.195
Level of Education	**r–value**	–0.105	–0.175	–0.339*	0.116
	***p*–value**	0.419	0.178	0.008	0.372
Brushing	**r–value**	–0.020	–0.039	–0.051	0.074
	***p*–value**	0.875	0.764	0.695	0.573
Use of Aids	**r–value**	0.100	–0.145	0.082	–0.133
	***p*–value**	0.460	0.282	0.546	0.322

Frequency of Brushing	**r–value**	0.063	–0.166	0.197	–0.238
	***p*–value**	0.640	0.219	0.143	0.074
Dental Visits	**r–value**	–0.042	0.058	0.009	–0.007
	***p*–value**	0.749	0.657	0.946	0.958
Regularity of Dental Visits	**r–value**	–0.128	–0.089	–0.008	0.234
	***p*–value**	0.360	0.528	0.955	0.091
Cause of Periodontal Disease	**r–value**	–0.028	–0.150	0.099	–0.068
	***p*–value**	0.831	0.249	0.450	0.602
Medical History	**r–value**	–0.006	0.087	0.263*	0.182
	***p*–value**	0.964	0.505	0.041	0.161
Tongue Burning	**r–value**	0.081	0.184	0.198	0.134
	***p*–value**	0.535	0.156	0.126	0.302
Use of Contraceptive Pills	**r–value**	0.048	0.135	–0.017	–0.019
	***p*–value**	0.712	0.299	0.900	0.884

* Correlation is significant at 0.05 level.

Table 3b: correlation among the study parameters and variables for the Pre–menopause group.

Parameters	**Spearman's Correlation**	**Variables**		
		DMFT	**FR**	**pH**
Marital Status	**r–value**	0.218	0.195	–0.148
	***p*–value**	0.092	0.132	0.255
Number of Pregnancies	**r–value**	0.098	–0.002	0.083
	***p*–value**	0.518	0.990	0.584
Level of Education	**r–value**	–0.127	0.263*	–0.064
	***p*–value**	0.331	0.041	0.623
Brushing	**r–value**	–0.112	0.081	–0.258*
	***p*–value**	0.389	0.535	0.045
Use of Aids	**r–value**	0.233	0.036	0.024
	***p*–value**	0.081	0.788	0.858
Frequency of Brushing	**r–value**	0.171	–0.125	0.187
	***p*–value**	0.203	0.354	0.164
Dental Visits	**r–value**	0.100	0.081	0.131
	***p*–value**	0.445	0.535	0.313
Regularity of Dental Visits	**r–value**	–0.120	–0.044	–0.216
	***p*–value**	0.392	0.754	0.120
Cause of Periodontal Disease	**r–value**	0.060	–0.058	–0.224
	***p*–value**	0.647	0.656	0.082
Medical History	**r–value**	–0.109	–0.112	–0.033
	***p*–value**	0.402	0.391	0.799
Tongue Burning	**r–value**	–0.111	–0.029	0.054
	***p*–value**	0.393	0.827	0.682
Use of Contraceptive Pills	**r–value**	0.191	0.132	0.139
	***p*–value**	0.139	0.309	0.286

* Correlation is significant at 0.05 level.

Regarding the second group (post–menopause), the correlation was found to be significant between level of education and pH. Also, a significant correlation was found between tongue burning on one hand and plaque, gingival, calculus and pocket depth indices on the other hand. Lastly, a significant correlation was obvious between use of contraceptive pills and FR. These results were elucidated in Table (4 a and b).

Table 4a: correlation among the study parameters and variables for the Post–menopause group.

Parameters	**Spearman's Correlation**	**Variables**			
		Plaque Index	**Gingival Index**	**Calculus Index**	**Pocket Depth**
Marital Status	**r–value**	–0.165	–0.143	–0.170	–0.122
	***p*–value**	0.211	0.278	0.197	0.357
Number of Pregnancies	**r–value**	0.038	0.128	–0.092	–0.164
	***p*–value**	0.827	0.456	0.592	0.338

Level of Education	**r–value**	–0.007	–0.031	–0.212	0.075
	***p*–value**	0.961	0.815	0.107	0.573
Brushing	**r–value**	0.103	0.021	–0.096	–0.095
	***p*–value**	0.439	0.874	0.471	0.476
Use of Aids	**r–value**	0.057	0.008	0.304	–0.006
	***p*–value**	0.747	0.964	0.080	0.974
Frequency of Brushing	**r–value**	–0.119	–0.239	0.094	0.207
	***p*–value**	0.495	0.167	0.592	0.233
Dental Visits	**r–value**	0.134	0.127	0.033	0.078
	***p*–value**	0.311	0.337	0.802	0.557
Regularity of Dental Visits	**r–value**	0.037	–0.123	–0.060	0.074
	***p*–value**	0.813	0.426	0.697	0.635
Cause of Periodontal Disease	**r–value**	–0.193	–0.137	–0.178	–0.107
	***p*–value**	0.143	0.300	0.177	0.419
Medical History	**r–value**	0.132	0.079	0.085	0.255
	***p*–value**	0.320	0.552	0.520	0.051
Tongue Burning	**r–value**	0.261*	0.307*	0.318*	0.304*
	***p*–value**	0.048	0.019	0.015	0.020
Use of Contraceptive Pills	**r–value**	0.052	0.002	0.075	0.029
	***p*–value**	0.694	0.986	0.572	0.830

* Correlation is significant at 0.05 level.

Table 4b: correlation among the study parameters and variables for the Post–menopause group.

Parameters	**Spearman's Correlation**	**Variables**		
		DMFT	**FR**	**pH**
Marital Status	**r–value**	–0.105	0.008	0.247
	***p*–value**	0.427	0.950	0.059
Number of Pregnancies	**r–value**	0.139	0.050	0.285
	***p*–value**	0.420	0.773	0.092
Level of Education	**r–value**	–0.011	–0.134	–0.382*
	***p*–value**	0.934	0.311	0.003
Brushing	**r–value**	–0.198	0.052	0.047
	***p*–value**	0.132	0.695	0.723
Use of Aids	**r–value**	0.062	–0.068	–0.223
	***p*–value**	0.728	0.702	0.204
Frequency of Brushing	**r–value**	0.155	–0.094	–0.251
	***p*–value**	0.373	0.593	0.145
Dental Visits	**r–value**	0.046	–0.100	0.119
	***p*–value**	0.730	0.451	0.369
Regularity of Dental Visits	**r–value**	–0.024	–0.072	0.011
	***p*–value**	0.879	0.645	0.945
Cause of Periodontal Disease	**r–value**	0.116	0.017	0.216
	***p*–value**	0.380	0.899	0.101
Medical History	**r–value**	0.045	–0.080	0.056
	***p*–value**	0.733	0.546	0.675
Tongue Burning	**r–value**	0.075	–0.192	–0.013
	***p*–value**	0.578	0.148	0.925
Use of Contraceptive Pills	**r–value**	–0.071	–0.286*	–0.053
	***p*–value**	0.596	0.028	0.689

* Correlation is significant at 0.05 level.

DISCUSSION

There are a relationship between dental caries,periodontal diseases,such as gingivitis and periodontitis,saliva and puberty, menstruation, pregnancy, oral contraceptive use, and menopause due to alterations in the level of sex hormones(especially estrogen and progesterone) through women life cycle.

Menopause is found to be associated with significant adverse changes in the oro-facial complex along with other general changes. To deliver high quality care, dental practitioners need to be knowledgeable about menopause and its

oral manifestations as a possible risk factor for increasing oral health problems. According to this study, the comparison between the pre- and post-menopausal groups regarding the following variables: Plaque index, gingival index, calculus index, pocket depth, DMFT, FR and pH. All the results showed a significant difference between the two groups except those for DMFT and pH.

Bad oral health status according to clinical parameters in postmenopausal women can be explained on the basis of the hormonal changes and decreased immunity and immunoglobulin especially IgA. Thus the less immunity lead to higher dental caries, missing teeth, gingival inflammation, calculus and plaque deposition also increase pocket depth.(7)

The mean values of the above mentioned variables for the post-menopause group were found to be higher than those for the pre-menopause group, this result was in agreement to that of pervious other studies.(27, 28)

Regarding the first group (pre–menopause), the following correlations were found to be significant: Number of pregnancies vs. gingival index, level of education vs. calculus index and FR, brushing vs. pH, and medical history vs. calculus index.

Oral tissues can be affected by pregnancy. 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.(29)

The correlation among the above mentioned parameters and variables for the second group (post-menopause). The correlation was found to be significant between level of education and pH. Also, a significant correlation was found between tongue burning on one hand and plaque, gingival, calculus and pocket depth indices on the other hand. Lastly, a significant correlation was obvious between use of contraceptive pills and FR. Women who use contraceptive pills (contain progesterone), which cause increases in the level of that hormone in the body, which may lead to gum inflammation due to the body's exaggerated reaction to the toxins produced from dental plaque.

For other physical parameters, the reduction in flow rate during postmenopausal period due to sex hormones especially HCG which lead to reduction in a more acidic pH also is related to the effect of progesterone hormone which lead to decrease plasma biocarbonate level during postmenopausal period which increase the susceptibility to oral diseases.(30)
The results of this study were in agreement with the results of other epidemiologic studies which have identified a number of risk factors and risk indicators for periodontal attachment loss (PAL), including demographic socioeconomic, behavioral, genetic, and systemic factors.(31–35). However, according to Ship*et al* andYalcinF*etal*. there is no difference in flow rates between premenopausal and menopausal women.(36,37)Therefore,for all this causes there is an importance of preventive dentistry increases with aging inwomen.

CONCLUSION

There is a decrease in the salivary pH and flow rate in postmenopausal women which in leads to increased periodontal and DMFT indicesgreater than pre menopause women. Also there are a number of risk factors and risk indicators have direct or indirect effects onwomen's oral health.

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