Dental Plaque and Gingivitis in Relation to Knowledge and Attitude among Osteoporotic Menopausal Women in Baghdad City, Iraq

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ABSTRACT

Background: Dental plaque is complex biofilm. Gingivitis is first stage of body responses towards dental plaque present in the oral cavity; it characterized by gum redness, swelling and bleeding without periodontal attachment loss. Osteoporosis occurs when new bone formation and old bone resorption are not equal. During menopause, women experience an increased rate of bone loss. **Objective**: The current study aimed to evaluate dental plaque and gingivitis in relation to knowledge and attitude among osteoporotic menopausal women in Baghdad, Iraq.

Patients and methods: A cross sectional study was conducted on women attending Medical city teaching hospital in Baghdad city. The total sample composed of 90 menopausal women, and their age ranged from 45 to 65 years old. First (study) group consisted of 45 menopausal women with osteoporotic disease as appeared in dual energy X-ray absorptiometry (DEXA) scan. The second (control) group consisted of 45 menopausal women without osteoporosis as appeared in DEXA. Plaque and gingival indices were examined. Women's knowledge and attitude about osteoporosis, vitamin D and oral health were assessed. **Results**: Mean value of plaque and gingival indices were higher in study group than control with no statistical significant difference. Knowledge and attitude of studied women toward osteoporosis, vitamin D and oral health findings showed no statistical significant differences.

Conclusion: Dental plaque and gingivitis are high among menopausal women with osteoporotic disease. Therefore, old women with osteoporosis need more oral health educational and preventive programs.

Keyword: Osteoporosis, Menopause, Dental plaque, Gingivitis, Cross sectional study, University of Baghdad.

INTRODUCTION

Osteoporosis is a condition that causes disturbance of bone microarchitecture, low bone mass, and degeneration of bone tissue. It can weaken bone strength and increase the chance of fractures [(1)].

It happens when the amount of new bone formation and old bone resorption are not in balance. Not enough new bone is produced by the body, too much old bone is reabsorbed, or both are occurring. As a result, the bones could deteriorate, making them more brittle and prone to breaking. The incidence of osteoporosis and bone loss increases with age; in addition, lack of certain hormones, mainly estrogen in women and androgen in men, is the main contributor to osteoporosis [(2-3)]. The dual energy X-ray absorptiometry (DEXA) scan is a device use for osteoporosis diagnosis and screening makes the Bone Mineral Density (BMD) test available for many patients [(4)]. Vitamin D supplementation and calcium are recommended as a complementary treatment even if dietary supply is appropriate [(5)].

Menopause is characterized as the cessation of menstruation brought on by the decline in ovarian follicular activity [(6)].

Dental plaque is thought to be a varied colony of bacteria that live on the surface of teeth as a biofilm and are trapped in an extracellular matrix of polymers of both microbial and host origins [(7)]. Dental plaque builds up gradually layer-by-layer, causing the environment to become oxygen-deprived and finally allowing anaerobic bacteria to colonize. Fusobacterium species are the intermediary colonizers between primary and secondary colonizers [(8)]. Gingivitis is the first stage of the body's reaction to local factors present in the oral cavity, which is characterized by gum redness, swelling and bleeding, without periodontal attachment loss (AL) [(9)]. Many patients are unable to recognize the disease or ignorant of it, as it is frequently painless and seldom results in spontaneous bleeding [(10)] and there is no bone or periodontal support being lost, so it is reversible.

According to histopathology, collagen fibers within the lamina propriety are damaged, which causes ulcerations in the sulcular epithelium [(8)].

Numerous epidemiological researches used the gingival index (GI) or Community Periodontal Index (CPI) of Treatment Needs (CPITN) for assessing gum inflammation to determine the prevalence of periodontal diseases [(11)].

Plaque biofilm is more harmful to gingival tissue and inflammation of the gingiva is linked to circulating sex hormone levels [(9)].

Although raised ovarian hormone levels, as observed in puberty, menstruation, and pregnancy can cause a rise in gingival inflammation and microbial alterations in dental plaque [(12)].

Contrarily, a lack of hormones during menopause might also result in poor periodontal health. It is hypothesized that hormonal changes and a decline in bone mineral density (BMD) increase postmenopausal women's tendency for alveolar bone loss [(13)]. Gender [(14)], dental calculus, oral hygiene, socioeconomic variables

and oral health behaviors are additional risk factors for gingivitis [11].

The level of oral health is important to allow someone to eat, speak, and interact socially without suffering of active illness, embarrassment or discomfort that leads to overall wellbeing [15]. The facts, information, and abilities picked up through experience or education are the best way to define knowledge. Furthermore, it could relate to a subject's theoretical or practical grasp [16].

An attitude in psychology is a collection of belief, emotions and behaviors toward a specific person, thing, or event [17].

The traditional behavior change model states that if knowledge can be transferred to community, it tends to improve attitudes and behaviors among the general public that are relevant to health. However, there are many other factors play a significant impact, and the actual relationship among health related attitudes, oral health awareness, and behavior is not so clear [18].

The current study aimed to evaluate dental plaque and gingivitis in relation to knowledge and attitude among osteoporotic menopausal women in Baghdad, Iraq.

PATIENTS AND METHODS

A cross sectional comparative study was conducted on women attending Medical city teaching hospital in Baghdad city. The total sample composed of 90 menopausal women, and their age ranged from 45 to 65 years old. The present research was carried out between December 2021 and April 2022.

The study group consisted of 45 women with osteoporosis as diagnosed in DEXA scan. The control group consisted of 45 women without osteoporosis as diagnosed in DEXA scan. The present study used a control group who were similar as possible as to age; social structure and geographic position except in osteoporotic condition; also, they were examined using the same DEXA Scanning for diagnosis.

As any questionnaire format, questions about personal name, age, medical status and mensuration had taken from the women. The plaque was evaluated by the use of Plaque Index (PlI) of **Loe and Sillness** [19], also, the gingival inflammation was evaluated by the use of Gingival Index (GI) of **Loe and Sillness** [20]. A list of questionnaire was asked to the women about their knowledge and attitude for osteoporosis, vitamin D and oral health, as listed in **table 1, 2, 3, and 4** [21-22].

Table 1: Oral health questionnaire related to knowledge.

1- Do you know that a clean mouth can prevent tooth decay?				Yes	No
2- Do you know what floss is?				Yes	No
3- What does irregular tooth brushing cause?	Decay	Gum disease	Bad breath	Stains on teeth	Nothing	All of the above
4- Regular cleaning of mouth can prevent		Bleeding from gums	Loosening of gums	Loss of teeth	Bad smell	All of the above

Table 2: Oral health questionnaire related to attitude.

5- Have you visited a dentist before?					Yes	No
6- If yes, then for what reason?	Decay	Pain	Extraction	Filling	Any others specify
7- Do you think maintaining a healthy mouth is individual responsibility?				Yes	No
8- Do you think it is required to visit a dentist periodically to maintain the oral health?				Yes	No

Table 3: Vitamin D questionnaire related to knowledge.

13- Vitamin D supplementation is only necessary if sunlight exposure is low.	Strongly Agree/Agree	Not sure	Strongly Disagree/Disagree
14- We need to expose our body to sunlight every day.	Strongly Agree/Agree	Not sure	Strongly Disagree/Disagree
15- Exposure to sunlight can reduce the risk of osteoporosis	Strongly Agree/Agree	Not sure	Strongly Disagree/Disagree
16- I still have time to improve my bone health status.	Strongly Agree/Agree	Not sure	Strongly Disagree/Disagree

Table 4: Vitamin D questionnaire related to attitude.

9- Vitamin D can be produced from sunlight.	Correct	Not sure	Wrong
10- Vegetables are among the food sources containing vitamin D.	Correct	Not sure	Wrong
11- The only body part that needs to be exposed to sunlight is the face.	Correct	Not sure	Wrong
12- Bone diseases such as osteoporosis are associated with vitamin D deficiency.	Correct	Not sure	Wrong

Exclusion criteria

All women were with medical disorders such as; artificial joints; patients with chronic renal failure, thyroid gland diseases; history of untreated cancer or recent cancer therapy; metabolic bone diseases and use of medications like thyroid hormone, corticosteroids, anti-seizure drugs and insulin dependent therapy and other supplements such as receiving multivitamins, calcium and vitamin D3 supplements and smoker women.

Ethical Approval:

This study was ethically approved by the Institutional Review Board of University of Baghdad, College of Dentistry and Iraqi Ministry of Health. Written informed consent was obtained from all participants. This study was executed according to the code of ethics of the World Medical Association (Declaration of Helsinki) for studies on humans.

Statistical Analysis

The collected data were introduced and statistically analyzed by utilizing the Statistical Package for Social Sciences (SPSS) version 21 for windows (Chicago, Illinois, USA). Qualitative data were defined as numbers and percentages. Chi-Square test and Fisher's exact test were used for comparison between categorical variables as appropriate. Quantitative data were tested for normality by Kolmogorov-Smirnov test. Normal distribution of variables was described as mean and SD, and independent sample t-test was used for comparison between groups. Pearson correlation (r) was used to describe the correlation between two continuous quantitative variables bivariate normally distributed. P value ≤0.05 was considered to be statistically significant.

RESULTS

By analyzing plaque index (PlI) among study and control group, result showed that PlI is higher in the study group than in control group but with no significant difference as shown in **Table 5**, also, the gingival index (GI) was higher in the study group than in control group but with no significant differences as showed in **Table 6**. Moreover, **table 7** showed the correlation between PlI and GI where there was strong positive significant correlation in the study group between PLI and GI while there was weak positive not significant correlation in the control group.

The distribution of women according to their Knowledge and attitude towards Vitamin D, osteoporosis and oral health had shown in **Table 8**, results showed that there was no significant association among study and control groups.

The first 4 questions were about the knowledge of women towards oral health in which the first question was about a clean mouth that prevent tooth decay, all women in study group answered (Yes) which were higher than control group (43 women) with P-value 0.494.

Regarding questions about: Do you use dental floss?, what does irregular toothbrush cause?, and regular cleaning of mouth can prevent, all women in study and control groups answered the same answer.

The next 4 questions were about the attitude of women towards oral health. Regarding question about visiting dentist before, all women in study and control groups answered (Yes), while the question regarding the reason of last visiting, filling was most answered (14 women) followed by pain (11 women) and extraction (11 women) in study group, while extraction was higher answer (15 women) in control group followed by pain (12 women) and other specify (9 women), and P-value 0.451.

Regarding question about the women opinion if their responsibility to maintain healthy mouth, all women in study and control groups answered (Yes), also the answering of the question regarding the visiting of dentist periodically can maintain oral health, all women in both groups answered (Yes).

The next 4 questions were about women's knowledge towards osteoporosis and vitamin D.

Regarding question for vitamin D can be produced from a sun, most women in both groups answered (correct) with P-value 1.00.

In answering question about the vegetables if they are among the food source of vitamin D, most women in both groups answered (correct) with P-value 1.00.

Regarding women knowledge about body part that need to be exposed to the sunlight is face only, most women answered (Wrong), with P-value 1.00.

In the answering the question about osteoporosis, if it can be associated with vitamin D deficiency, 91% of study group and 95.5% of control group answered (correct) with P-value 0.677.

The last 4 questions were about women's attitude towards osteoporosis and vitamin D.

Regarding the answering for vitamin D supplementation is necessary only if sunlight exposure is low, most women disagreed with P-value 1.00.

In answering a question about the need of exposing our body to sunlight every day, most women strongly agreed with P-value 1.00, also question if exposing to sunlight can decrease risk of osteoporosis, most women strongly agreed and P-value 1.00.

In answering the question about improvement of women's bone healthy status, most women strongly agreed that they still have the time to improve their bone healthy status and P-value 1.00.

Table 5: Mean value and standard error of plaque index among study and control groups.

Groups	Mean	SE	T test	P-value
Study	1.086	0.076	0.713	0.478
Control	1.016	0.061		NS

Table 6: Mean value and standard error of gingival index among study and control group.

Groups	Mean	SE	T test	P-value
Study	1.456	0.085	0.651	0.517 NS
Control	1.382	0.075		

Table 7: Correlation between plaque index and gingival index among groups.

Groups		GI	
		R	P-value
Study		0.652	0.000
Control	Pl	0.273	0.070

Table 8: Assessment of women (study and control groups) regarding their knowledge and attitude towards Vitamin D, osteoporosis and oral health

Women's knowledge and attitude questionnaire towards Vitamin D, osteoporosis and oral health		Groups				Statistical test	
		Study		Control			
		N.	%	N.	%	Fisher's exact	P-value
Q1- Do you know that a clean mouth can prevent tooth decay?	Yes	45	100	43	95.56	2.045	0.494
	No	0	0.00	2	4.44		
Q6- If yes, then for what reason?	Decay	2	4.44	1	2.22	2.879	0.451
	Pain	11	24.44	12	26.67		
	Extraction	11	24.44	15	33.33		
	Filling	14	31.11	8	17.78		
	Any others specify	7	15.56	9	20		
Q9- Vitamin D can be produce from sunlight.	Correct	41	91.11	42	93.33	0.155	1.00
	Not sure	4	8.89	3	6.67		
Q10- Vegetables are among the food sources containing vitamin D.	Correct	42	93.33	43	95.56	0.212	1.00
	Not sure	3	6.67	2	4.44		
Q11- The only body part that needs to be exposed to sunlight is the face.	Not sure	3	6.67	2	4.44	0.212	1.00
	Wrong	42	93.33	43	95.56		
Q12- Bone disease such as osteoporosis is associated with vitamin D deficiency.	Correct	41	91.11	43	95.56	0.714	0.677
	Not sure	4	8.89	2	4.44		
Q13- Vitamin D supplementations is only necessary if sunlight exposure is low.	Not sure	2	4.44	3	6.67	0.212	1.00
	Strongly Disagree/Disagree	43	95.56	42	93.33		
Q14- We need to expose our body to sunlight every day.	Strongly Agree/Agree	43	95.56	43	95.56	0.00	1.00
	Not sure	2	4.44	2	4.44		
Q15- Exposure to sunlight can reduce the risk of osteoporosis.	Strongly Agree/Agree	43	95.56	43	95.56	0.00	1.00
	Not sure	2	4.44	2	4.44		
Q16- I still have time to improve my bone health status.	Strongly Agree/Agree	43	95.56	43	95.56	0.00	1.00
	Not sure	2	4.44	2	4.44		

DISCUSSION

This study was designed to evaluate dental plaque and gingivitis in relation to knowledge and attitude among osteoporotic menopausal women in Baghdad city/Iraq. All women were attending Medical City Teaching Hospital in Baghdad city in Iraq. The group selected aged 45-65 years because bone loss may be age-associated due to poorer nutrition, and hormonal changes [23]. By analyzing the plaque index, results show that PlI is higher in study group than in control with no significant difference. Many other studies showed that there is increasing in plaque index during menopause because of the changing in hormones can make effect on salivary flow rate and dryness of the mouth [24-27]. Moreover, the analyzing of gingival index showed that GI in study group was higher than control. This agreed with other studies [28-31].

The knowledge and attitude questionnaire provided a detailed view of studied groups' knowledge and attitude about different oral health facts, including etiology of oral diseases and their prevention, and about vitamin D and osteoporotic disease. Although the findings of the knowledge and attitude toward oral health showed that almost all women have some kind of knowledge and attitude toward oral health, but they have bad oral hygiene, in which highest number of the studied group (26) went to dentist to extract their teeth while only 3 women went to dentist because of decayed tooth. All women were unaware of using floss. These results lead to the fact that improvement in knowledge toward dental brushing and oral health care are needed,

In addition, using dental floss, because floss may help in removing plaque and debris interdentally. Increase the knowledge of using floss is important and agrees with other studies [22-34].

Almost all women (except 2) were aware of healthy mouth importance. They visited dentist only if there was problem in their teeth, this agreed with the study done by Almas et al. [34] and Maganur et al. [21]. Selvaraj et al. [35], reported that the individuals had good knowledge towards oral health and inadequate attitude and behavior.

By analyzing the result about knowledge and attitude of the women toward osteoporosis and Vitamin D, the results were that about 93% of studied groups had good knowledge toward vitamin D and osteoporosis and 95% had good attitude. This is because that they had already visited a physician before came to DEXA department.

The physician had explained the women's condition and gave them the instruction about how to reduce the effect of the disease then referred them to DEXA department to make the investigation. Jamil et al., in their study showed that female workers were having good knowledge and moderate attitude regarding vitamin D [32].

CONCLUSION

Dental plaque and gingivitis are high among menopausal women with osteoporotic disease. Therefore, old women with osteoporosis need more oral health educational and preventive programs.

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