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RESEARCH ARTICLE

Dental Health in Osteoporotic Women

**Dr. Annas Alyasiry[1], Dr. Zainab Mahmood Aljammali[1], Dr. Ahmed M. Almosawy[1],
Dr. Sabbah Alrubbaie[2]**
[1]Dentistry College, Dentistry Department, Babylon University
[2]Medicine College, Dentistry Department, Babylon University
Corresponding Author E-mail:

ABSTRACT:
Objective. The aim of the study was to examine the condition of periodontal tissues, the mobility of teeth, and the TMJ condition in osteoporosis women in different degree and age.
Subjects/ Methods. In this study 68healthy women with osteoporosis only were included; on the basis of the absolute value and T-score. The examined people were mainly females, aged between 30 and 70years, they were divided into three groups according to degree of osteoporosis. The clinical parameters used for determining the condition of periodontal tissues and the TMJ included: protrusion of mandible ,limited opening, drifting to one side, TMJ clicking, TMJ tender ,bleeding, gum recession, periodontitis, gingivitis, mobility of teeth and carious teeth was notified.
Results. All the patient in this study have TMJ tender with clicking (100%). The protrusion of the mandible in group one is the least than the other group. The limiting of mouth opening percentage was larger in the group 3 in older patient than the younger patient in the same group and in the other groups, and it was obvious that the periodontitis, gingivitis and bleeding were increased in group (1 &2) in older age. The number of missing teeth was the largest in older age group, and proportional to the osteoporosis degree increase.
Conclusion. The osteoporosis has effects on the oral health and associated with TMJ tender and clicking, protrusion of the mandible, drifting of jaw to one side and limiting of mouth opening percentage, and all these effects increased in the older age patient than the younger patient. The percentage of carious teeth, gingivitis, the bleeding and the number of missing teeth was increase with the osteoporosis degree increase.

KEYWORDS: Dental health, osteoporosis, women.

INTRODUCTION:
Osteopenia is a reduction in bone mass due to an imbalance between bone resorption and formation, favoring resorption, resulting in demineralization and leading to osteoporosis. Osteoporosis is a disease characterized by low bone mass and fragility and a consequent increase in fracture risk.[1]

There are many causes of osteoporosis such as: Failure to attain adequate peak bone mass in early 20's, chronic illness e.g chronic liver disease, chronic renal failure, thyroid disease, particularly hyperthyroidism or excessive thyroxine replacement, smoking, sedentary lifestyle, excessive caffeine intake (> 5 – 6 cups/day), excessive alcohol intake, lifelong low calcium intake, increasing age, genetic factors and ethnic factors (Caucasian and Asians), hormone deficiency states (late menarche, premature menopause ,menopausal state, testosterone deficiency in males), vitamin D deficiency, primary hyperparathyroidism, prolonged immobilization, Cushing's syndrome or disease, corticosteroid therapy (doses of prednisolone > 5 – 7.5 mg dailyor an equivalent dose of another glucocorticoid for greater than 2 months; any dose of glucocorticoid in the elderly > 65 yrs), malabsorptive illnesses eg Coeliac disease, Crohn's disease, eating disorders (Anorexia nervosa, Bulimia), rheumatoid arthritis, organ transplant

recipients, treatments for certain malignancies e.g breast cancer, prostate cancer.[2]

Osteoporosis and periodontitis are diseases which affect a large number of women and men, with incidence increasing with advancing age. Periodontitis is characterized by inflammation of the supporting tissues of the teeth, resulting in resorption of the alveolar bone as well as loss of the soft tissue attachment to the tooth and is a major cause of tooth loss and edentulousness in adults.[1] Both osteoporosis and periodontal disease share many risk factors and since both are bone resorptive diseases it has been hypothesized that osteoporosis could be a risk factor for progression of periodontal disease.[3]

In the United States osteoporosis affects more than 25 million people and predisposes patients to more than 1.3 million fractures annually.[4] Since alveolar bone loss is a clinical feature of periodontal disease, disturbances in bone metabolism and decreases in the bone mineral density(BMD) of the skeleton, especially in the jaws, may be a factor in periodontal disease.[5]

The clinical importance of generalized bone loss as a contributor to alveolar bone loss and subsequent tooth loss is unclear. To date, the evidence for an association between tooth loss and bone mineral density in the extra-cranial skeleton has been derived from cross-sectional studies and results have been inconclusive.[6]

Bando et al.[7] suggested that sufficient masticatory function with periodontally healthy dentition may inhibit or delay the progress of osteoporotic changes in skeletal bone, or that edentulous women may be more susceptible to osteoporosis. The role of osteoporosis or osteopenia in the etiology of periodontal disease is not fully understood. An observational study supported the possible role of low skeletal BMD or osteoporosis as risk indicators for reduced alveolar crestal height.[5]

Several large studies conducted in early postmenopausal women failed to find significant associations between tooth status and BMD. Elders et al.[8] found no relationship between the number of missing teeth and either spine BMD or metacarpal thickness. Krall et al.[9]conducted a longitudinal study on associations between tooth loss and bone loss in whole bodies, in the femoral neck, and in the spine. This study included 189 healthy white dentate postmenopausal women who participated in three intervention trials conducted within a 7-year period. Forty-five women (24%) reported having lost one or more teeth. The rates of BMD changes at all three sites (whole body, femoral neck, spine) were independent predictors of tooth loss in the multivariate models supporting a role of systemic bone loss in the development of tooth loss among post-menopausal women. Epidemiologic research shows that chronic periodontitis is related to osteoporosis. Several studies have already indicated that insufficient estrogen is closely related to periodontitis and osteoporosis. Recently, an increasing number of researchers suggest that PMO promotes periodontitis.[6,10,11] It has been demonstrated that periodontal bacteria promote the alveolar bone loss in periodontitis. The invasion of periodontal bacteria may reduce bone density and enhance osteoclastic activity by releasing toxins and/or inflammatory cytokines [12.] These cytokines believed to be involved in alveolar bone remodeling are also highly expressed in PMO[13].Since estrogen inhibits the expression of the inflammatory cytokines, it might be that larger amounts of these cytokines are presented in an inflammatory alveolar bone with estrogen deficiency. Therefore, estrogen deficiency may contribute to the alveolar bone absorption in periodontal disease, either by reducing the bone mass of alveolar bone or by causing increased expression of inflammatory cytokines. However, the underlying mechanisms are still not clear. Rondernos et al.[14] studied the possible association of periodontal disease with femoral BMD in a large sample of U.S. adults (N = 11,655). Their finding indicates that, in the presence of high calculus scores, females with osteoporosis are at an increased risk for attachment loss. In a study population of 70 post-menopausal Caucasian women aged 51-78, skeletal systemic BMD was assessed by DXA. Clinical attachment loss and inter proximal alveolar bone loss represented periodontal disease severity. Mean alveolar bone loss significantly correlated with systemic BMD. A trend for a correlation between clinical attachment levels and BMD was found[6].

The aim of the study was to examine the condition of periodontal tissues ,the mobility of teeth, and the TMJ evaluation in osteoporosis women who were diagnosed with osteoporosis in different degree and age.

MATERIALS AND METHODS:
The study was conducted in Marjan Teaching Hospital at Rheumatology Department from October /2014 to December /2014.In thisstudy68healthy women who diagnosis with osteoporosisonly were included; on the basis of the absolute value of T-score, excluding the diabetics, hypertensive, and cardiac disease patient. The examined people were females, aged between 30 and 70,they were divided into three groups according to degree of osteoporosis (OP) as follow:

Group 1: 22 patients who have OP1-2 degree.

Group 2: 24 patients who have OP2-3 degree.

Group 3: 22 patients who have OP more than 3 degree.

The clinical parameters used for determining the condition of periodontal tissues and the TMJ condition included: protrusion of mandible ,limited opening, drifting to one side, TMJ clicking, TMJ tender, bleeding, gum recession, periodontitis, gingivitis, mobility of teeth and carious teeth was notified. The instruments used periodontal probe, dental probe, dental mirror, twizer, and Dual X-ray absorptiometry (DXA).

Figure (1): Dual Energy X-Ray Absorptiometry in Merjan Teaching Hospital. (Zahraa, Almamory,2013)

Procedure of Bone Mineral Density Measurement:
Weight and age were measured for each patient. Height should be measured with a stadiometer, with shoes off, using standard techniques (patient standing erect with the head in the Frankfort horizontal plane)and weight (in kilograms) were measured with standard weighting scale, to calculate body mass index (BMI) (BMI calculated by dividing the weight of the patient in kilograms by the height in square meter) with patient age, sex, ethnic group for each patient was entered in densitometry[15].

Patient should wear comfortable clothing, avoiding garments that have zippers, belts or buttons made of metal. Objects such as keys or wallets that would be in the area being scanned should be removed, in the central DXA examination, which measures bone density in the hip and spine, the patient lies on a padded table. An X-ray generator is located below the patient and an imaging device, or detector, is positioned above. To assess the spine, the patient's legs are supported on a padded box to flatten the pelvis and lower (lumber)spine. To assess the hip, the patient's foot is placed in a brace that rotates the hip inward, in both cases, the detector is slowly passed over the area, generating images on a computer monitor, the technologist will walk behind a wall or into the next room to activate the X-ray machine.

The DXA bone density test is usually completed within 10 to 30 minutes, depending on the equipment used and the parts of the body being examined (Figure 1).

RESULTS:
Table (1) showed the range of age distribution. Table (2,3,4)showed that proximally all the patient in this study have TMJ tender and clicking (100%).Table (2) show that the protrusion of the mandible in group one is the least than the other group. Table (2,3,4)showed that the drifting of jaw to one side in group 1 and 2 is equal with slight increase in group 3.Table (4) show that the limiting of mouth opening percentage was larger in the group 3 in older patient than the younger patient in the same group and in the other groups. Table (7) show that the percentage of carious teeth , gingivitis, and the bleeding was the least in the group (3), and it was obvious that the periodontitis ,gingivitis and bleeding were increased in group (1 &2) in older age. From the figure (2,3,4) we notice that the number of missing teeth was the largest in older age range, and increase with the osteoporosis degree increase.

Discussion:
The protrusion of the mandible is the least in age range (30-49) but in older patient it (100%) and the probable explanation is that the presence of teeth specially in upper and lower jaw prevent the protrusion while in older age after missing of teeth protrusion of the mandible will occur. The percentage of carious teeth , gingivitis, and the bleeding was the least in the group (3), this can be explained by the number of missing teeth was larger in this group, so the absent of teeth was the reason for this result ,this edentulousness could be due to periodontal disease that occurred earlier in the individual's life, so the tooth loss can alter the interpretation of the current status of periodontal disease. Loss of several periodontally involved teeth can result in an improvement of periodontal scores, but in general it was obvious that these scores increased in osteoporosis

patient. The percentage of teeth mobility increased in the osteoporotic women this can be explained by increased the periodontal ligament loss ,this result was agreed with the results of American Dental Association Council on Access[16] and with Marcus et al[17]

The periodontitis ,gingivitis , gum recession, mobility of teeth and bleeding were increased in group (1 &2) in older age(50-70 year), this due to post menopause woman that there is insufficient estrogen which is closely related to periodontitis and osteoporosis. And this result was agree with the result of Brennan et al[10] and Tezalet al[6]who suggest that PMO promotes periodontitis and with Pihlstrom et al[12]which has been demonstrated that periodontal bacteria promote the alveolar bone loss in periodontitis, and the invasion of periodontal bacteria may reduce bone density and enhance osteoclastic activity by releasing toxins and/or inflammatory cytokines . These cytokines believed to be involved in alveolar bone remodeling are also highly expressed in PMO [13]. Since estrogen inhibits the expression of the inflammatory cytokines, it might be that larger amounts of these cytokines are presented in an inflammatory alveolar bone with estrogen deficiency. Therefore, estrogen deficiency may contribute to the alveolar bone absorption in periodontal disease, either by reducing the bone mass of alveolar bone or by causing increased expression of inflammatory cytokines. In the other hand this result disagree with the study of Lundstromet al[18] which found that there was no statistical significant differences were found in gingival bleeding, probing pocket depths, gingival recession or marginal bone level between the women with osteoporosis and the women with normal BMD. The number of missing teeth was increase with the osteoporosis degree increase and this result was agree with the study of Kribs[19].

The most widely used techniques for assessment of bone mineral density are dual-energy X-ray absorptiometry(DXA) and quantitative computed tomography[20,21].Dual energy X-ray absorptiometry is the most precise and the diagnostic measure of choice as quantitative computed tomography though being more sensitive, causes greater radiation exposure[21].

Conclusion:
With the limitation of this study, we can conclude that the osteoporosis has effects on the oral health ,by causing TMJ tender and clicking, protrusion of the mandible, drifting of jaw to one side and limiting of mouth opening percentage, and all these effects mostly the older patient than the younger patient. The percentage of carious teeth , gingivitis, the bleeding and the number of missing teeth was increase with the osteoporosis degree increase.

Recommendations:
Made a study for more duration period (long duration), compare between male and female patient, and compare between the healthy and rheumatoid arthritis patient.

Limitation:
The duration of the study was short period, the number of patient was little, only female patients, and only healthy patient, also the interpretations of the present study may be limited since periodontal measures of bone such as subtraction radiography not available.

Table(1):Distribution of osteoporosis patients according to age:

No.	No. of patients	Age range
1	4	30-39
2	14	40-49
3	34	50-59
4	16	60-70

Table (2): group (1) from 30-39= 2 / 40-49=4/ 50-59=12 /60-70=4

No	Name	TMJ tender	TMJ clicking	Drifting to one side	Limited opening	Protrusion of mand.
1	30-39	100%	100%	0%	0%	0%
2	40-49	100%	100%	0%	0%	50%
3	50-59	100%	100%	66.6%	83.3%	100%
4	60-70	100%	100%	100%	100%	100%

Table (3) group (2) from 30-39= 2 / 40-49=6/ 50-59=12 /60-70=4

No.	Name	TMJ tender	TMJ clicking	Drifting to one side	Limited opening	Protrusion of mand.
1	30-39	100%	100%	0%	0%	100%
2	40-49	100%	100%	0%	0%	100%
3	50-59	100%	100%	66.6%	33.3%	83.3%
4	60-70	100%	100%	100%	100%	100%

Table (4) group (3) from 40-49=4/ 50-59=10 /60-70=8

No.	Name	TMJ tender	TMJ clicking	Drifting to one side	Limited opening	Protrusion of mand.
1	30-39	0%	0%	0%	0%	0%
2	40-49	100%	80%	33.3%	66.6%	66.6%
3	50-59	100%	60%	60%	60%	100%
4	60-70	100%	100%	100%	100%	100%

Table (5) group (1)from 30-39= 2 / 40-49=4/ 50-59=12 /60-70=4

No.	Name	Carious teeth	Mobility of teeth	gingivitis	Periodontitis	Gum recession	Bleeding
1	30-39	100%	0%	100%	0%	0%	100%
2	40-49	100%	50%	100%	0%	0%	100%
3	50-59	50%	66.6%	100%	50%	50%	100%
4	60-70	100%	100%	100%	100%	100%	100%

Table (6) group (2) from 30-39= 2 / 40-49=6/ 50-59=12 /60-70=4

No.	Name	Carious teeth	Mobility of teeth	gingivitis	periodontitis	Gum recession	Bleeding
1	30-39	100%	0%	100%	0%	0%	100%
2	40-49	100%	33.3%	100%	33.3%	33.3%	100%
3	50-59	100%	33.3%	100%	50%	50%	100%
4	60-70	33.3%	100%	100%	100%	100%	100%

Table (7) group(3)from 40-49=4/ 50-59=10 /60-70=8

No.	Name	Carious teeth	Mobility of teeth	gingivitis	periodontitis	Gum recession	Bleeding
1	30-39	0%	0%	0%	0%	0%	0%
2	40-49	100%	100%	100%	100%	100%	100%
3	50-59	80%	60%	100%	60%	60%	80%
4	60-70	50%	75%	75%	75%	75%	75%
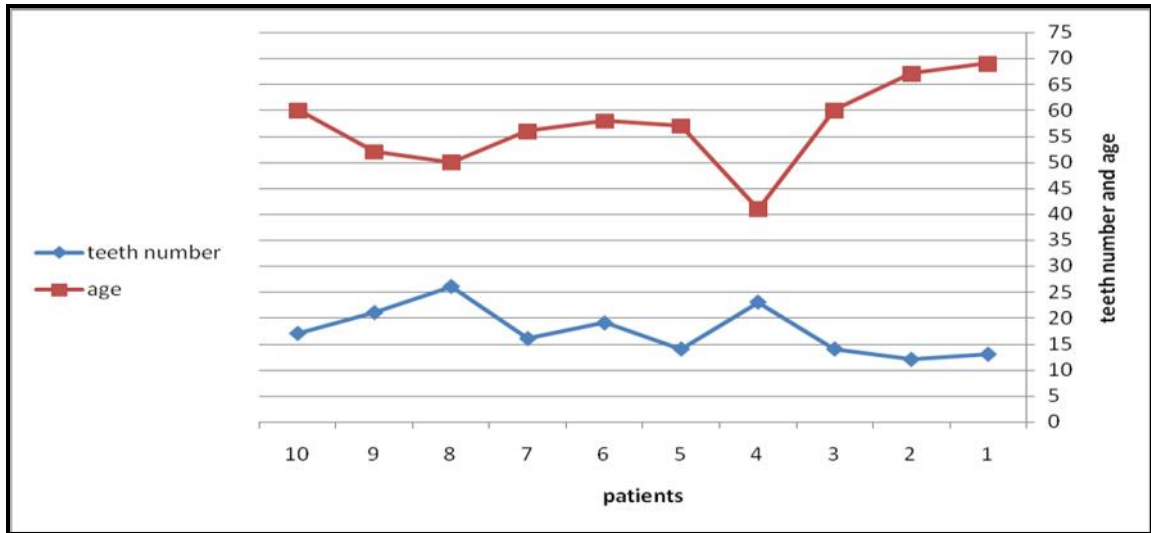
Figure(2):Relationship between age and teeth number in patients with osteoporosis degree (1-1.9)
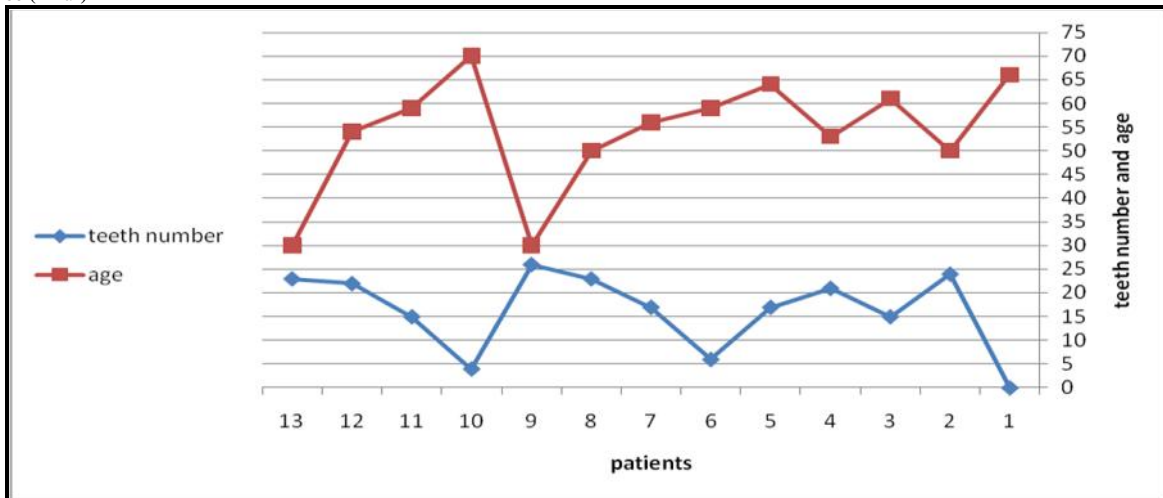
Figure(3) Relationship between age and teeth number in patients with osteoporosis degree (2-2.9)
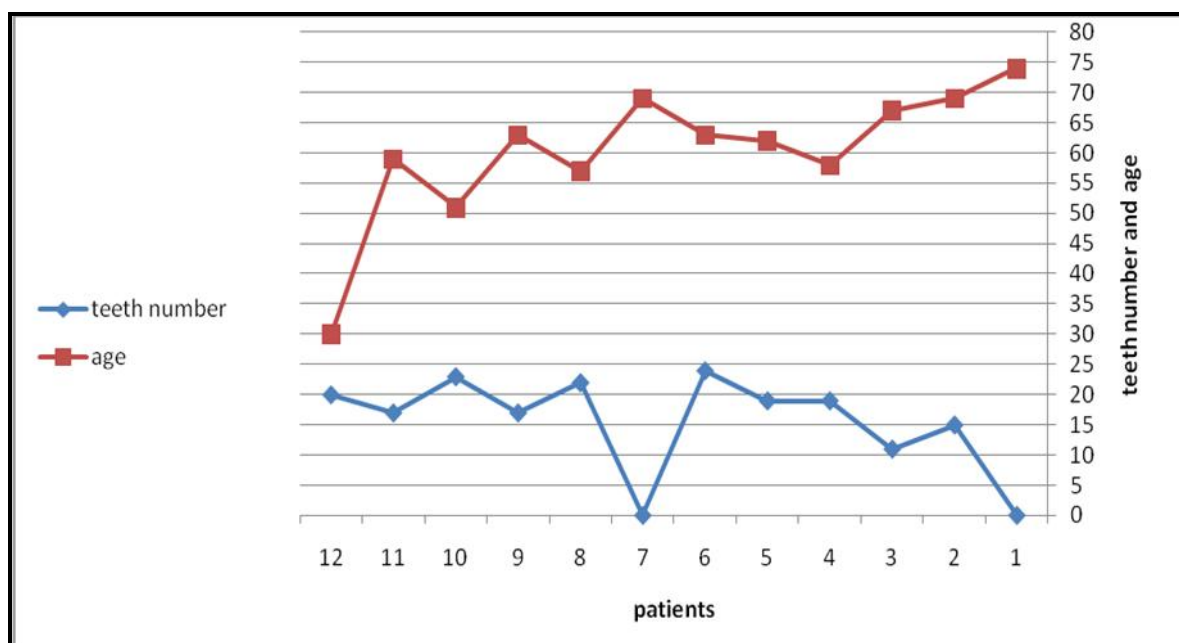
Figure(4) Relationship between age and teeth number in patients with osteoporosis degree (3-3.9)

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