Journal of Research in Medical and Dental Science
2019, Volume 7, Issue 1, Page No: 61-65

Available Online at: www.jrmds.in
eISSN No.2347-2367: pISSN No.2347-2545

Analysis Periodontal Health Status in Postmenopausal Women with Osteoporosis Referring to Rheumatology Clinics in Yazd and Healthy People

Ahmad Haerian[1], Mahboube Daneshvar[2], Fatemeh Zarebidoki[1], Behzad Ahmadi[1*]

[1]Department of Periodontics, Faculty of Dentistry, Shahid Sadoughi University of Medical Science, Yazd, Iran

[2]Department of Pediatric Dentistry, Faculty of Dentistry, Arak University of Medical Science, Arak, Iran

ABSTRACT

Introduction: Clinical studies on the effect of systemic conditions on periodontal diseases have shown that some systemic deficiencies may provide grounds for the onset of periodontal diseases. One of these systemic problems is osteoporosis, which may be a risk factor for the onset and exacerbation of periodontitis. This study tends to evaluate periodontal indices in osteoporotic menopausal women and compare them with healthy controls.

Materials and Methods: In this case-control study, participants included 45-75 year-old menopausal women referred to rheumatology wards of the Khatamolanbia Clinic and Shahid Sadoughi Hospital in Yazd; their bone density was determined by DEXA-scan and by imaging the femoral-lumbar bone. Thirty patients with osteoporosis and 30 subjects with normal BMD were selected. Then, informed consent was obtained for participation in the study. During the clinical examinations, tooth loss (TL), plaque index (PI), gingival recession, pocket probing depth (PPD), clinical attachment lost (CAL), and tooth mobility (TM) were measured to evaluate the periodontal status. These clinical examinations were performed to determine the periodontal status by catheter, mirror and probe.

Results: During the evaluation, there was no significant difference in PPD, PI, TM, gingival recession, and CAL between case and control groups (p-value>0.05); that is, osteoporosis has no effect on above factors. These periodontal factors are almost the same in both healthy and patient groups. In the case of missing teeth, the following results were obtained: the mean of missing teeth was 22.173% of the total teeth in the case group and 18.583% of the total teeth in the control group. In the study of the missing teeth in the case and control groups, there was a significant relationship between case and control groups (p-value=0.025).

Conclusion: In fact, since periodontal disease is multifactorial and microbial plaque is the main cause, osteoporosis is considered as a predisposing factor in exacerbation or persistence of periodontal disease. In patients with osteoporosis, usually pathological fractures, hormonal changes, and aging lead to reduced physical activity and affect the oral health, which leads to manifestation of periodontal disease. But this disease increases tooth loss by changing the shape and structure of bone trabeculae and weakening them. Osteoporosis does not seem to be a deterministic factor in incidence of periodontal disease, since it affects bone quality rather than bone quantity.

Key words: Plaque index, Periodontal pocket depth, Tooth mobility, Osteoporosis, Gingival recession

HOW TO CITE THIS ARTICLE: Ahmad Haerian, Mahboube Daneshvar, Fatemeh Zarebidoki, Behzad Ahmadi, Analysis periodontal health status in postmenopausal women with osteoporosis referring to rheumatology clinics in Yazd and healthy people, J Res Med Dent Sci, 2019, 7(1): 61-65

Corresponding author: Behzad Ahmadi
e-mail✉**:** Be.ahmadi@iran.ir
Received: 06/12/2018
Accepted: 11/01/2019

INTRODUCTION

Osteoporosis is the most common metabolic bone disease and a progressive systemic disease which results from an imbalance between the rate of bone formation and bone recession and bone mineral mass loss.

This disease is characterized by reduction of bone mass and microstructural changes in bone tissue, which leads to an increased risk of fractures [1].

Low bone mass factors include: Female gender, aging, estrogen deficiency, caucasian race, and low weight, family history of osteoporosis, smoking, and history of previous fractures, alcohol and caffeine-containing beverages. The reason for osteoporosis in women is a shortage of sex steroids during menopause, which leads to an increase in bone replacement and its recession [2,3].

Periodontitis is a degenerative disease which refers to inflammation in the teeth protecting structures and the response of these tissues to localized inflammatory changes leads to bone recession and loss of attachments of this tissue to the teeth [4]. In recent years, the importance of the relationship between osteoporosis and periodontal

diseases has increased significantly. Although periodontal disease is caused by invasion of an infectious agent, some of the systemic disorders may provide grounds for periodontal diseases; one of these systemic problems is osteoporosis, which may act as a risk factor for development and intensification of periodontitis [5].

Brincat et al. showed that calcium and vitamin D intake are beneficial in preventing osteoporosis and maintaining teeth [6].

Gomes-Filho et al. concluded that osteoporosis is associated with the onset and progression of periodontitis; they observed that postmenopausal women with osteoporosis had a higher chance of periodontitis than women without osteoporosis [7]. Klemetti et al. also reported in their study on postmenopausal women that people with higher bone mineral content further keep teeth with periodontal deep pocket in jaw than osteoporotic people; in this study, density of femoral neck bone, spinal cord and mandibular cortex was measured by dual-energy X-ray absorptiometry [8]. On the other hand, Juluri et al. concluded that the rate of alveolar bone loss and periodontitis indexes were significantly higher in women with osteoporosis than healthy women [9].

Regarding the fact that osteoporosis and periodontitis involve a large population of men and women and aging increases the likelihood of developing these two diseases [10,11], it seems essential to study on preventing problems.

Therefore, this study tends to evaluate periodontal indices in osteoporotic menopausal women and compare them with healthy controls.

MATERIALS AND METHODS

In this case-control study, the samples were selected by random number table from menopausal women aged 45-75 years who referred to rheumatology wards of Khatamolanbia Clinic and Shahid Sadoughi Hospital in Yazd; their bone density was determined by Scan-DEXA by imaging the lumbar-femoral bone region. The number of samples was set at 60 according to similar studies and statistical calculations; 30 subjects with normal BMD (T-score>1) were selected as controls and 30 subjects (T-score<-2.5) were selected as cases. Then, informed consent was obtained from the participants. During the clinical examinations, tooth loss (TL), plaque index (PI), gingival recession (GR), pocket probing depth (PPD), clinical attachment lost (CAL), and tooth mobility (TM) were measured to evaluate the periodontal status. Osteopenic people, smokers, people with systemic diseases which intervene with periodontal disease such as diabetes and leukemia, long-term corticosteroid users (>7.5 mg/day for 6 months or more), women who removed their ovaries or became menopause before the age of 41, and toothless people were excluded. The rest of the subjects underwent clinical examination to determine the periodontal status by mirror catheter and probe catheter.

The degree of PPD and the distance from PPD to CEJ, or the same CAL, was measured by probe in mm and the number of missing teeth was recorded. Other variables were categorized as follows:

Plaque index

PI value was calculated by considering the Silness and Loe index, which is categorized as follows:

Grade 0: There are no plaques.

Grade 1: There is a thin layer of plaque appearing in the gingival margin by pulling a catheter.

Grade 2: Average value of the plaque along the gingival margin and visible interdental space.

Grade 3: Plaques are found in the gingival margin and interdental space.

Gingival recession

Gingival recession was categorized according to the Miller classification as follows:

Class I: Marginal gingival recession without extension to mucogingival junction and without bone recession.

Class II: Marginal gingival recession with extension to mucogingival junction and without bone recession.

Class III: Marginal gingival recession with extension to mucogingival junction and with bone recession.

Class IV: Marginal gingival recession with extension to mucogingival junction and with severe bone recession.

Tooth mobility

Grade 1: Occurs when the tooth moves by 1 mm in buccolingual direction.

Grade 2: Occurs when the tooth moves more than 1 mm in buccolingual direction.

Grade 3: Occurs when it moves in buccolingual direction and other directions, such as occlusogingival.

All these measurements were recorded in the patient questionnaire and data was analyzed using SPSS 16 software (p-value<1.15). The required tables and indices were prepared; t-test and Mann-Whitney test were used for statistical calculation.

RESULTS

The studied population consisted of 60 women aged 45-75 years old who referred to rheumatology wards of Khatamolanbia Clinic and Shahid Sadoughi Hospital in Yazd. Bone density was determined by Scan-DEXA by imaging lumbar-femoral bone. Thirty patients with normal BMD (T-score>1) were selected as controls and 30 patients (T-score<-2.5) were selected as cases.

The results obtained from examining the periodontal status in the two groups were as follows:

In terms of PPD and CAL, no significant relationship was found in the case and control groups (p-value=0.368; p-value=0.268).

Miller's Class III and IV gingival recession was not observed in either of the control and case groups (p-value=1.000). Miller's Class I and II recession was not significantly different in case and control groups (Class I: p-value=0.600; Class II: p-value=0.569).

Grade 3 tooth mobility was not observed and there was no significant difference between grade 1 and grade 2 in case and control groups (Grade 2: p-value=0.693; Grade 1: p-value=0.567).

Grade 3 plaque index was observed in a small number of patients, with no significant difference in the two groups (p-value=0.154) and the difference in grade 1 and grade 2 plaque index was not significant in the two groups (Grade 1: p-value=0.211; Grade 2: p-value=0.192), but grade 0 plaque index was significantly higher in the control group than the case group (p-value=0.028).

The mean of lost teeth was 22.173% of the total teeth in the case group and 18.583% of the total teeth in the control group. In examining the lost teeth in the case and control groups, a significant relationship was found, as shown in Table 1 (p-value=0.025).

Table 1: Determining and comparing periodontal indexes

Index	Control Mean ± SD	Case Mean ± SD	p-Value
PPD	3.11 ± 0.29	3.20 ± 0.49	0.368
CAL	2.40 ± 0.45	2.55 ± 0.55	0.28
Class 1 Gingival Recession	7.77 ± 9.98	11.77 ± 10.37	0.600
Class 2 Gingival Recession	0.82 ± 2.05	1.87 ± 0.40	0.569
Tooth Loss	5.77 ± 1.83	7.10 ± 2.51	0.025
Tooth Mobility grade 1	2.73 ± 3.55	3.44 ± 6.08	0.567
Tooth Mobility grade 2	0.81 ± 1.93	1.21 ± 2.75	0.693
Plaque Index grade 0	40.77 ± 29.36	25.93 ± 28.69	0.028
Plaque Index grade 1	48.07 ± 20.29	54.37 ± 23.12	0.211
Plaque Index grade 2	11.17 ± 14.29	18.80 ± 21.97	0.192
Plaque Index grade 3	0.00 ± 0.00	1.43 ± 5.64	0.154

DISCUSSION

Osteoporosis is a multifactorial illness which is associated with decreased physical activity, inappropriate nutrition, low calcium intake and vitamin D intake, high alcohol intake and smoking. This diffused bone disease leads to increased bone fracture by decreasing bone mass and changing its microscopic structure [12,13].

Periodontitis is an inflammatory disease of the tooth supporting tissues, characterized by extensive degeneration of periodontal ligaments and alveolar bone together with formation of pocket and gingival recession; it is one of the major causes of tooth loss [14]. Both of these diseases are very common, particularly at older ages [15]. Osteoporosis is more evident in women, because bone structure undergoes many changes during postmenopausal period due to estrogen deficiency; these changes ultimately lead to bone mass loss and osteopenia and osteoporosis. Due to these hormonal changes during this period, women tend to be more prone to periodontal diseases; particularly if oral hygiene is poor during this period, the incidence of periodontitis increases in women [9]. The relationship between these two diseases has been studied by a number of studies, but the exact role of osteoporosis is still unknown in the periodontal disease. The present study showed that teeth loss and plaque index are significantly higher in people whose BMD is lower than normal compared to healthy people, while CAL was not observed in tooth mobility.

Comparing osteoporotic and normal groups, Kribbs showed no significant difference between the two groups in terms of pocket depth, while tooth loss rate was significantly higher in the osteoporotic group [16]. The current study supported the relationship between osteoporosis and tooth loss. Similar to Kribbs study, no relationship was found on pocket depth. Examining osteoporotic and normal patients, Mohammad et al. found no difference between two groups in terms of gingival recession and pocket depth, similar to Wactawski-Wende and consistent with the current study [16-18].

Khorsand et al. examined the relationship between periodontal indexes and BMD of lumbar and thigh bones of three groups of menopausal women, including osteoporotic, osteopenic and normal. This study was performed on 61 menopausal women who found that TL, PI and PBI were significantly higher in the osteoporotic group than in the osteopenic and normal groups, but there was no difference between the three groups in PPD. Current study also supports the above results in terms of the significant relationship between BMD and PI and TL. However, it does not support the above finding on PBI [19].

A study on the relationship between osteoporosis and periodontal diseases performed by Reddy et al. measured BMD of metacarpal bone in postmenopausal women. Periodontal indices were also evaluated according to CPITN. In women with low BMD with osteoporosis, the number of teeth was lower than the normal group [20], as current study supports. Therefore, osteoporosis can be a factor of teeth loss, particularly during menopause. Koga et al. [1] investigated the relationship between TL and height of bone alveolus and BMD of the lumbar and pelvis and estrogen therapy and its duration. They showed a significant relationship between posterior teeth TL and estrogen therapy and total TL and duration of estrogen therapy; if estrogen therapy and its duration are considered as a preventative factor for postmenopausal osteoporosis and reduced BMD; it is consistent with the current study on the significant relationship between TL and BMD.

In the current study, as noted above, there was a significant difference between BMD and TL; moreover, the case group was significantly different from the control group. To explain this, reduced physical activity and changed lifestyle can be a cause of this finding. Even the incidence of osteoporotic complications (such as arthritis) can be considered as an exacerbating factor in this phenomenon.

CONCLUSION

It is complicated to present a relationship between osteoporosis and periodontitis, because both diseases are multifactorial and have the same mechanisms; there is a reasonable biological relationship that at least part of periodontal destruction is affected by bone loss. In fact, osteoporosis cannot be considered as the starting point of periodontal disease, but it is a predisposing factor in exacerbation or persistence of the disease after the onset of the disease. In patients with osteoporosis, pathologic fractures, hormonal changes and aging lead to manifestation of periodontal disease. However, this disease can increase tooth loss by changing the shape and structure of bone trabecula and weakening them. Osteoporosis does not seem to be a deterministic factor in the incidence of periodontal disease, since it affects bone quality rather than its quantity. It is clear, however, that longer studies with higher number of patients are required.

ACKNOWLEDGEMENT

The authors appreciate the Research Committee of the Shahid Sodoughi School of Medical Sciences for financing the study.

CONFLICT OF INTEREST

The authors declared no potential conflicts of interests with respect to the authorship and/or publication of this paper.

REFERENCES

1. Koga T, Takayanagi H. On "2015 guidelines for prevention and treatment of osteoporosis". Cellular mechanism and etiology of osteoporosis. Clinical Calcium 2015; 25:1293-300.
2. Lerner UH. Bone remodeling in post-menopausal osteoporosis. J Dent Res 2006; 85:584-95.
3. Willson T, Nelson SD, Newbold J, et al. The clinical epidemiology of male osteoporosis: A review of the recent literature. Clin Epidemiol 2015; 7:65.
4. Schwartz ZV, Goultschin J, Dean DD, et al. Mechanisms of alveolar bone destruction in periodontitis. Periodontol 1997; 14:158-72.
5. Murrieta JF, García RG, Contreras B, et al. Relationship between body mass index, bone mineral density, and oral hygiene with periodontal disease in a Mexican elderly group. J Oral Res 2016; 5:108-13.
6. Brincat M, Gambin J, Brincat M, et al. The role of vitamin D in osteoporosis. Maturitas 2015; 80:329-32.
7. Gomes-Filho IS, Passos JD, Cruz SS, et al. The association between postmenopausal osteoporosis and periodontal disease. J Periodontol 2007; 78:1731-40.
8. Klemetti E, Collin HL, Forss H, et al. Mineral status of skeleton and advanced periodontal disease. J Clin Periodontol 1994; 21:184-8.
9. Juluri R, Prashanth E, Gopalakrishnan D, et al. Association of postmenopausal osteoporosis and periodontal disease: A double-blind case-control study. J Int Oral Health 2015; 7:119.
10. Edwards MH, Dennison EM, Sayer AA, et al. Osteoporosis and sarcopenia in older age. Bone 2015; 80:126-30.
11. Eke PI, Wei L, Borgnakke WS, et al. Periodontitis prevalence in adults ≥ 65 years of age, in the USA. Periodontol 2016; 72:76-95.
12. Glibowski P. Dietary factors affecting osteoporosis and bone health in the elderly. In Molecular basis of nutrition and aging 2016; 345-54.
13. Vuolo L, Barrea L, Savanelli MC, et al. Nutrition and osteoporosis: Preliminary data of campania region of European personalised ICT supported service for independent living and active ageing. Translational Medicine @ UniSa 2015; 13:13.
14. Bhattarai G, Poudel SB, Kook SH, et al. Resveratrol prevents alveolar bone loss in an experimental rat model of periodontitis. Acta Biomater 2016; 29:398-08.
15. Bernal M, Elenkova M, Evensky J, et al. Periodontal disease and osteoporosis-shared risk factors and potentiation of pathogenic mechanisms. Curr Oral Health Rep 2018; 5:26-32.

16. Kribbs PJ. Comparison of mandibular bone in normal and osteoporotic women. J Prosthet Dent 1990; 63:218-22.
17. Mohammad AR, Brunsvold M, Bauer R. The strength of association between systemic postmenopausal osteoporosis and periodontal disease. Int J Prosthodont 1996; 9.
18. Wactawski-Wende J. Periodontal diseases and osteoporosis: association and mechanisms. Annals Periodontol 2001; 6:197-208.
19. Khorsand A, Paknejad M, Vakili F. Evaluation of periodontal condition of menopause women with osteoporosis and osteopenia and comparison with control group. J Dent Med 2006; 19:76-83.
20. Reddy MS. Osteoporosis and periodontitis: Discussion, conclusions, and recommendations. Annals Periodontol 2001; 6:214-7.