

Osteoporosis and Periodontal Disease

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Both osteoporosis and periodontal diseases are bone-resorptive diseases. Osteoporosis and osteopenia are characterized by reductions in bone mass and may lead to skeletal fragility and fracture. In most women, bone mass reaches its peak in the third decade of life (age 20 to 30) and declines thereafter. This decline in bone mass is accelerated with the onset of menopause, and oral symptoms are also found in addition to the systemic manifestations of menopause. An increased incidence is observed of oral discomfort, including pain, a burning sensation, dryness, and altered taste perception, as well as a debated rise in the prevalence of periodontal disease.

Periodontitis, an inflammatory disease characterized by resorption of the alveolar bone as well as loss of the soft tissue attachment to the tooth, is a major cause of tooth loss in adults. Since loss of alveolar bone is a prominent feature of periodontal disease, severe osteoporosis could be suspected of being an aggravating factor in the case of periodontal destruction. In recent years, there has been increasing interest in the interrelationship between systemic osteoporosis, oral bone loss, tooth loss, and periodontal disease. It has been hypothesized that the breakdown of periodontal tissue may, in part, be related to systemic conditions that also predispose the patient to osteoporosis/osteopenia; however, some other reports failed to find this correlation.

Kribbs¹ showed no significant differences in periodontal measurements (mean probing depth and attachment loss) between osteoporotic and normal groups. Another cross-sectional study demonstrated that periodontal attachment loss was correlated with tooth loss, but not with vertebral or proximal femur bone density.² Elders and coworkers³ examined periodontal condition and measured lumbar bone mineral density (lumbar BMD) in 286 female volunteers between 46 and 55 years of age. No significant correlation was observed between the clinical parameters of periodontitis (mean probing depth, occurrence of bleeding after probing and number of missing teeth)

and the lumbar BMD, nor was a significant relation observed between the bone mass measurements and alveolar bone height. Thus, they concluded that systemic bone mass was not an important factor in the pathogenesis of periodontitis. Similar findings were reported in an age cohort study of 70-year-old women. No statistically significant differences were found in gingival bleeding, probing pocket depth, gingival recession and marginal bone level between 15 women with osteoporosis and 21 healthy subjects.⁴ In controlling for some potential confounding factors of age, smoking and number of remaining natural teeth, Weyant *et al.*⁵ were still not able to provide statistically significant association between the parameters of periodontal disease and measures of systemic BMD.

In contrast to previous reports, other authors have found a significant relation between systemic osteoporosis and loss of periodontal tissue.^{6,7} A case-control study comparing 12 osteoporotic fracture women and 14 normal women found that there was significantly greater loss of periodontal attachment in the osteoporotic women than in the normal women.⁶ Similar findings were shown in a cross-sectional investigation of the association between systemic BMD and periodontal status. In that study, thirty post-menopausal, Asian-American women were screened for osteoporosis and chronic periodontitis. Periodontal assessments included tooth loss, plaque index, probing depths, and clinical attachment levels. Statistically significant negative correlations were found between BMD and tooth loss and BMD and clinical attachment loss that were independent of plaque scores.⁷

In another study controlling for known confounders, the relationship between systemic bone mineral density and periodontal disease in 70 postmenopausal Caucasian women aged 51 to 78 was investigated. BMD was assessed by dual-energy x-ray. The severity of periodontal disease was represented by clinical attachment loss and interproximal alveolar bone loss (ABL). Mean ABL significantly correlated with BMD was found. Clinical attachment loss appeared to be re-

lated to skeletal bone mineral density consistently at all regions of the skeleton, but the results did not reach the level of statistical significance.⁸ For a 2-year longitudinal clinical study, the alveolar bone height and density changes in 21 osteoporotic/osteopenic women were compared with those of 17 women with normal lumbar spine BMD. These subjects were postmenopausal women having a history of periodontitis and participating in a periodontal maintenance program. The results indicated that osteoporotic/osteopenic women exhibited a higher frequency of loss in alveolar bone height and crestal bone density relative to women with normal BMD.⁹ However, these results should be interpreted with caution since the compared groups are small.

Basically, interpretation of results from these studies is complicated by the variety of methods used to assess osteoporosis and periodontitis, as well as varying definitions of outcomes of interest. If osteoporosis is a predisposing factor for periodontal tissue destruction, then a relationship should exist between measures of systemic bone mineral density and periodontal tissue destruction. However, previous studies have failed to establish a strong relationship. Possible explanations for this could be lack of precise methods for assessment of bone density and confounding of the result by other factors such as age, gender, smoking, remaining nature teeth, hormone intake, exercise of jaw bone, and most importantly the host susceptibility to dental plaque and oral hygiene status. Moreover, the cross-sectional studies have their own limitations, since little information is available about the pattern of disease progression during the short period of the study, nevertheless, most osteoporosis and periodontal disease progress in a chronic pattern.

Although findings of these studies regarding the association between osteoporosis and periodontal disease are still controversial, with increases in the number of aged patients in Taiwan society, the dialogue among medical and dental professional in this field provides a unique viewpoint in achieving and maintaining patients' optimal health. Clearer understanding of this relationship may aid health care providers in their efforts to detect and prevent osteoporosis and periodontal disease.¹⁰ To date, few longitudinal studies have been performed. To better evaluate the relationship between bone mineral density and periodontal disease, additional prospective

longitudinal studies with further analysis of possible confounding factors for osteoporosis and periodontal disease in larger cohorts of post-menopausal women are needed. However, dentists must bear in mind that the primary etiology of periodontal disease is pathogenic bacterial plaque in a susceptible patient. Therefore, if good oral hygiene is combined with regular check-ups, the effects that any of osteoporotic factors may exert on the periodontal tissues can be minimized.

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