Association between periodontitis and osteoporosis and possible therapeutical approaches in periodontology—a literature review

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Summary

In this review the association between osteoporosis and periodontitis is discussed. Many research groups have considered a possible relationship between systemic loss of bone density and local bone loss which occurs in periodontal disease.

The goal of this review is to find evidence-based answers to frequently asked questions concerning osteoporosis and periodontitis. Furthermore, possible new treatment approaches, deriving from osteoporosis therapy, for periodontal disease will be discussed.

A broad search strategy of the literature using both Pubmed and the Cochrane library was taken for this review. The search was done with “osteoporosis”, “periodontitis”, “therapy”, “calcium” and “vitamin D” were used. Inclusion criteria limited the amount of results by only considering clinical trials and reviews.

Whether or not osteoporosis affects the severity of periodontal disease remains controversial. Various studies indicate that osteoporosis or low systemic bone mineral density can be a risk factor for periodontal disease progression and increased alveolar bone loss. Other studies could not find any significant correlation.

Vitamin D and calcium might positively influence periodontal health.

Estrogen replacement therapy resulted in significantly less bone resorption and increased alveolar bone loss. Other studies on periodontal disease can be a risk factor for periodontal disease.

In this review the association between osteoporosis and periodontitis is discussed. Because of biological mechanisms such as high osteoclast activity and elevated IL-1 expression, it seems plausible that there is a correlation between these two diseases but until now, studies have shown inconclusive results. Thus, the aim of this study was to review the latest literature on new findings concerning this subject.

Another interesting phenomenon concerning therapeutic approaches for osteoporosis that has been observed in recent years. Various osteotropic drugs seem to have an effect on periodontal tissues. The latest findings in therapy will be discussed here as well.

Background and Aim

Osteoporosis and periodontitis are diseases affecting a large number of people worldwide, causing tremendous costs for healthcare. One in three women and one in five men over the age of 50 will suffer an osteoporotic fracture and about 1.3 million hip fractures due to osteoporosis occur worldwide. In the adult population, 50% suffer from periodontal disease and 8% from a severe form of periodontitis.

Both affect the elderly and impact their quality of life. Osteoporosis and periodontitis share various risk factors, as shown below, and both diseases affect bone. Because of biological mechanisms such as high osteoclast activity and elevated IL-1 expression, it seems plausible that there is a correlation between these two diseases but until now, studies have shown inconclusive results. Thus, the aim of this review was to review the latest literature on new findings concerning this subject.

Methods and Materials

The Cochrane Library and Pubmed were used in this literature review. The main search keywords were “Osteoporosis” AND “Periodontitis”. Other search key words were “therapy”, “calcium” and “vitamin D” in association with the main two keywords.

Additional filters included “humans”, “clinical trial”, “meta analysis” and “systematic review”.

66 results were found. Bisphosphonate therapy, osteonecrosis, implants and osseointegration were excluded from this study. (10 studies excluded)

Of the remaining 56 studies, 15 did not discuss the topic or had no abstract available, leaving 41 studies for evaluation.

Concluding remarks

AN ASSOCIATION BETWEEN OSTEOPOROSIS AND PERIODONTITIS COULD NOT BE STATISTICALLY PROVEN.

DESPITE THE AMOUNT OF STUDIES, AUTHORS BLAME SMALL SAMPLE SIZES AND LACK OF PROSPECTIVE STUDIES FOR UNCLEAR RESULTS.

TOOTH LOSS IS ASSOCIATED WITH OSTEOPOROSIS.

THE INFLAMMATORY MEDIATORS ARE INVOLVED IN BOTH DISEASES (IL-1, IL-6, TNF-a).

Osteoporosis

Female gender
Caucasians, Asians
Hypogonadism
Hyperparathyroidism
High protein intake
Low vitamin D or calcium intake
Sedentarism
Low peak bone mass
Heparij therapy
Low weight

Periodontitis

Bacterial plaque
Stress
Diabetes
Pregnancy

Risk factors

Common

Poor nutritional status
High age
Glucocorticoid therapy
Immunological diseases
Family history

Results

Fourty-four studies addressed a possible association between osteoporosis and periodontitis. However, no statistical significant correlation between osteoporosis and periodontitis disease could be found in the studies evaluated.

Most suggest that low bone mineral density is a shared risk factor of both diseases rather than a causative factor. However, further research and prospective studies are necessary.

Discussion

Since both osteoporosis and periodontitis are diseases which affect the bone, various researchers have attempted to show a correlation between them.

Even though they share common risk factors, various studies could only show a weak or no correlation at all, blaming small sample sizes and insufficient study designs. Furthermore, not all studies adjusted for confounding variables such as age, smoking or diabetes.

Age is another difficult factor since osteoporosis becomes more severe in the elderly, however, at the moment, many people are edentulous in older age. Thus, sample sizes become smaller.

Comparing study outcomes proved to be difficult because different methods were used for diagnosing both osteoporosis (DXA was most common but different sites, such has hip, spine, wrist, etc. were evaluated) and periodontitis (radiographic assessment of alveolar ridge resorption and/or clinical assessment such as clinical attachment level, BoP, calculus, etc.).

The inflammatory process of osteoporosis is now beginning to be understood and both periodontitis and osteoporosis show the same cytokines involved, implying that osteoporosis is also a disease controlled by osteoimmunological responses.

Literature