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Assessment of the effects of Alendronate treatment on periodontal health status and salivary levels of Osteoprotegrin and TNF-α in postmenopausal women with osteoporosis (A Comparative study)

A Thesis
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Abstract

Background: Osteoporosis and periodontal disease considered as a major health problem principally in aged women with complex and recognized association. Postmenopausal osteoporosis also known as type I osteoporosis typifies a common illness in female patients by the onset of menopause due to estrogen reduction. Many investigations were linked osteoporosis with the appearance and progression of periodontal disease. Although the etiology of both is rather different, the bone loss presents in both shares several characteristics especially the involvement of the same proinflammatory cytokines and bone metabolism markers.

Alendronate is a first line drug for treatment of postmenopausal osteoporosis and it is a powerful inhibitor of osteoclast function, it diminishes bone resorption moreover, it was suggested of having osteo-stimulative property as revealed through increase in bone matrix formation. Osteoprotegrin (OPG) is a secretory glycoprotein considered as a novel soluble decoy receptor known as "bone protector" since it prevents extreme bone resorption via inhibition of osteoclast differentiation and activity through competing for binding site with Receptor activator of nuclear factor kappa-B-Ligand (RANKL). Various studies proposed that increase proinflammatory cytokines production such as Tumor necrosis factor-alpha (TNF-α) are crucial factor in the pathogenesis and development of periodontal diseases (PD) as well as osteoporosis. Evidence advocated that bone loss connected with menopause may be due to excessive activation of osteoclast (OC) via proinflammatory cytokines as a result of estrogen deficiency.

Aims of the Study: 1. To estimate and compare the periodontal health status of control and study groups.

2. To assess the effect of alendronate treatment on clinical periodontal parameters in postmenopausal women with osteoporosis.

3. To assess the effect of alendronate treatment on salivary levels of osteoprotegrin and Tumor Necrosis Factor-alpha in postmenopausal women with osteoporosis and compare with other groups in relation to periodontal health status.

4. To correlate between clinical periodontal parameters and biochemical parameters in control and study sub groups.

Materials and Methods: Total sample of 90 female subjects their age range was (55-65 years) were divided into three groups (30 subjects in each group): First: Control group systemically healthy postmenopausal subjects without osteoporosis with healthy periodontium. Second: (Alendronate group) postmenopausal women with osteoporosis under alendronate treatment for (3-6) months. Third: (Osteoporosis group) postmenopausal women with osteoporosis without alendronate treatment; the last two groups were further divided in to two sub groups each one consist of 15 gingivitis and 15 chronic periodontitis.

Five ml of unstimulated salivary samples were collected from all participants, after that the samples were centrifuged and salivary supernatants were collected and kept frozen until analyzed biochemically using Enzyme Linked Immuno sorbent Assay (ELISA) for quantitative measures of OPG and TNF- α concentrations. The clinical periodontal parameters (plaque index(PLI), gingival index(GI), bleeding on probing(BOP), probing pocket depth(PPD), and clinical attachment loss(CAL) were documented for all subjects and for all teeth in four surfaces except third molars and recorded in specifically designed documents following collection of saliva.

Results: Osteoporosis group demonstrated the highest values of all clinical periodontal parameters followed by Alendronate group (except for PLI with higher value in Alendronate group).Highest median value of salivary OPG was found in Alendronate group followed by control group while the lowest was

found in Osteoporosis group .Regarding TNF-α the highest median value was found in Osteoporosis group followed by control group then in Alendronate group. It was found a highly significant difference between the study groups regarding biochemical markers and clinical parameters. Spearman's Correlation Coefficient between salivary levels of OPG and TNF-α and clinical parameters were not significant at all subgroups. Correlation between ALN intake duration and clinical periodontal parameters were non-significant with (PLI, BOP), highly significant correlation with GI and non-significant correlation with (PPD, and CAL).

Conclusion: Patients with osteoporosis had greater periodontal tissue destruction with increased levels of TNF-α and decreased level of OPG as compared with patients under alendronate treatment with less periodontal tissue destruction , decrease level of TNF-α and increase OPG level, so these biochemical markers may be used as an indicator of periodontal tissue destruction. Additionally alendronate treatment may have beneficial outcome on periodontal health status as well as salivary markers of bone metabolism in postmenopausal women with osteoporosis and periodontal disease.