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Oral Findings, Hormonal Assay and Cytokines Biomarkers in Serum and Saliva of Postmenopausal Women with Osteoporosis

A thesis
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Abstract

Background:

Osteoporosis is a skeletal disease characterized by decreased bone mass and increased fracture risk. Bone mineral density measurements are gold standard in calculating bone mass, the changes are usually late and the damage is irreversible. The incidence of osteoporosis is high after menopause due to estrogen deficiency and the relationship between menopausal estrogen deprivation and pro-inflammatory status is considered to be involved in postmenopausal bone turnover. Saliva is the filtrate of serum plus the gingival crevicular fluid which provide an inexpensive, non-invasive and accessible diagnostic element.

Aims of the study:

The purposes of this study were to evaluate the periodontal status (clinical attachment loss and number of missing teeth), severity of xerostomia and burning mouth sensation in postmenopausal women with and without osteoporosis and to describe the variation of some markers(calcium, alkaline phosphatase, estrogen hormone, follicle stimulating hormone, interleukin - 6, interleukin - 1beta and tumor necrosis factor alpha) in serum and saliva and to observe if these markers could be used as simple tool to predict bone turnover due to osteoporosis among postmenopausal women.

Subjects, materials and methods:

Bone mineral density and skeletal structures of the spine were evaluated by using central dual energy x-ray in Institute of radiology/Baghdad Medical City in 75 postmenopausal women, which were divided to three groups: post menopause with osteoporosis (25) women, with osteopenia (25) women and non-osteoporosis non- osteopenia control group (25) women according to dual energy x-ray results.

The assessment of clinical attachment loss was done by combination of gingival recession and clinical pocket depth using William periodontal probe in six Ramfjord index teeth. Calculation of missing teeth was also done. Severity of xerostomia was

evaluated by using the Xerostomia Inventory questioner. Burning mouth sensation was also evaluated by using diagnostic criteria questioner.

Whole saliva and blood serum had been collected; salivary flow rate was estimated as ml/ minutes. Calcium was determined by flame atomic absorption spectrophotometer following standardized procedure. Alkaline phosphatase concentration was determined using colorimetric determination of alkaline phosphates activity kit. Estrogen hormone was determined by using estradiol $-E_2$ kit. Follicle stimulating hormone was determined by Immunoradiometric method . Interleukin- 6, interleukin-1 beta and tumor necrosis factor alpha were determined by using ELISA kits.

Results:

It has been shown that no significant difference was found between studied groups regarding the age, body mass index and xerostomia inventory score, while duration of menopause was significantly higher in osteoporosis group than healthy controls.

Salivary flow rate was significantly lower in osteoporosis group than controls and showed a high statistically significant moderately strong positive linear correlation with bone mineral density.

Number of missing teeth, clinical attachment loss and the frequency of burning mouth sensation were significantly high in osteoporosis group than control group, but only number of missing teeth and clinical attachment loss showed a statistically significant and moderately strong positive linear correlation with bone mineral density.

Salivary and serum calcium were significantly lower in osteopenia and osteoporosis groups than control group. Salivary calcium showed a statistically significant strong positive linear correlation with serum calcium.

Salivary and serum alkaline phosphatase were significantly high in osteoporosis group than control group, at the same time salivary alkaline phosphatase showed no statistical significant correlation with serum alkaline phosphatase.

Salivary and serum estrogen were significantly lower in osteopenia and osteoporosis groups than control group, but only serum estrogen showed a high statistically significant strong correlation with bone mineral density. Salivary follicle stimulating

hormone was significantly high in osteopenia group than control group, while no significant difference in serum follicle stimulating hormone was noticed between studied groups.

Salivary interleukin - 6, interleukin - 1 beta and tumor necrosis factor alpha were significantly high in osteoporosis group than control group, but only IL-6 showed a high statistical significant strong positive linear correlation with bone mineral density. Serum interleukin – 6 , interleukin - 1 beta and tumor necrosis factor alpha were significantly high in osteopenia and osteoporosis groups than control group and showed a high statistical significant strong positive linear correlation with bone mineral density.

Conclusions

The effect of osteoporosis was stronger than the effect of osteopenia on decreasing salivary flow rate and on increasing number of missing teeth and clinical attachment loss. On the other hand, both of osteopenia and osteoporosis have weak effect on xerostomia inventory score. Serum and salivary interleukin - 6 can be used as strong predictors of osteoporosis.