

THE EVALUATION OF CLINICAL AND IMAGISTIC PARAMETERS ON OSTEOPOROSIS PATIENTS

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ABSTRACT

Introduction Osteoporosis represents a frequent disease in female patients with onset menopause; the search of skeletal demineralisation association with the periodontal disease, characterised by alveolar bone loss, another frequent disease of adult population, is a necessity. **Materials and method** This study was conducted on 52 female subjects, with onset menopause, with the age of 44-65 years, with osteoporosis. The medical history was registered; we evaluated the periodontal indexes and the panoramic radiographies for bone resorption index. **Results** The local factors indexes presented high values, specific for periodontal disease. The bone loss was correlated with the periodontal indexes values and with the periodontal attachment loss. **Conclusions** This study reveals a significant correlation between osteoporosis and periodontal disease; we also found an important relation between local risk factors and the attachment loss.

Key-words: periodontal disease, risk factors, bone mineral density, bone cortex, periodontal indexes.

INTRODUCTION

The bone cortex represents an important component of the maxillary bones; it is affected by any skeletal bone impairment. While on young ages the formation, apposition and functional restructuration are the main processes, the involution and bone mass loss are predominant on old ages [1, 2]. Apart from the causal factor of periodontal disease (the bacterial factor), the existence of local and systemic risk factors was clearly demonstrated. Thus, the periodontal disease, characterised by attachment loss and tooth loss, is related to various systemic diseases, like diabetes mellitus, respiratory impairments, cardiovascular conditions and osteoporosis [3, 4, 5]. Osteoporosis is a disease with reduced

bone density and quality, leading to a skeletal fragility, with a great bone fracture risk (especially of the spine, wrist and hip) [6, 7, 8]. The risk for osteoporotic fractures ranges for women from 30 to 50% and for men from 15 to 30%. Theoretically, with a less initial bone quantity, the same bacterial infection could generate a faster resorption of the alveolar bone. The osteoporosis prevalence grows within the old age patients and the periodontal disease and the osteoporosis present a great incidence (more of 72% of over 35 years old population is suffering from different forms of periodontal disease) [9, 10], therefore **the purpose of this study** was to examine the relation of osteoporosis as a risk factor for periodontal diseases and to

understand if its presence is an important issue for the periodontal treatment and prophylaxis.

MATERIALS AND METHOD

This study was conducted on 52 female subjects, with the age ranging from 44 to 65 years, during a period of three years (2010-2012), in the Periodontology Clinic of "Grigore T. Popa" University of Medicine and Pharmacy, Iași, Romania. Criteria for inclusion were as follows: female patients, post-menopause; osteoporosis diagnosis, by bone density radiology tests.

Criteria for exclusion: diabetes mellitus, neoplasms; hormonal substitution therapy for more than 6 months; steroids or antibiotics therapy longer than 6 months.

Data collection

The information referring to the age of the menopause onset and other problems related was obtained. On local clinical examination we noted the number of present teeth, the reason for tooth loss and the signs of gingival inflammation. Debris component of oral hygiene index, calculus index, gingival index (Loe and Silness) and bleeding index were recorded.

We examined and recorded the probing depths, the attachment loss, the tooth mobility, the furcation lesions and the pathological dental migrations. The vertical probing was conducted with a Williams periodontal probe and the furcation involvement was assessed using a Nabers probe.

Osteoporosis diagnosis

15 cases were diagnosed with osteoporosis by the specialist, using clinical examination and radiology tests. The clinical signs included backache, fracture of the fore arm and fractures during daily activities. Antero-posterior and lateral radiographs of the lumbar spine were made. 37 cases were diagnosed with the aid of bone densitometer and the T score was registered.

The critical T score values were as

follows:

- 0 to 1 value: normal
- -1 to -2.5 value: osteopenia
- values over -2.5: osteoporosis.

Radiograph examination

Panoramic radiographs were obtained for all the 52 patients. The mandibular cortex was examined distally from the mental foramen and the following classes were concluded [11]:

- C1: normally conformed bone cortex with an even endosteal margin on both the sides
- C2: moderately eroded cortex with semilunar defects on the endosteal margin
- C3: severely eroded cortex, with an endosteal margin clearly porous.

The alveolar bone resorption index was measured by the Wical and Swope method [12]: the inferior edge of the mental foramen was delimited; a parallel line to the long axis of the mandible, tangential to the inferior border of the mandible was traced. A line perpendicular to this tangent, intersecting the inferior border of the mental foramen was drawn. The mandibular height (from the inferior border of the mandible to the superior margin of the alveolar ridge) and the basal height (from the inferior border of the mandible to the inferior edge of the mental foramen) were measured. The alveolar bone resorption index was obtained by dividing the mandibular height to the basal height.

Statistical analysis

The Student's t-test was used in order to reveal the study parameters signification between the mandibular cortex classes and Pearson's correlation coefficient to find the relationship of alveolar bone resorption index with the study parameters.

RESULTS

We initially examined a number of 83 patients but only 52 of them presented the inclusion criteria for this study. The mean age of the study subjects was 54.99 ± 3.45 years

but 39% of the participants were in the group of 55 to 65 years. The mean age for the menopause inset was 52.24 ± 4.24 years. 64.6% of the study population were from urban environment and 39.45% from rural environment (Fig.1).

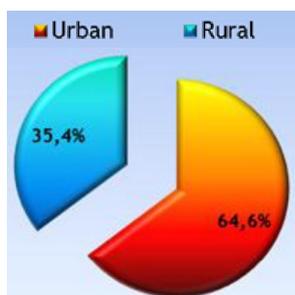


Fig. 1. The subjects distribution based on the environment

Periodontal Parameters

Debris Index

The mean value for the debris index was of 1.21 ± 0.32 . This index was strongly correlated with the C2 bone cortex class. We observed a positive correlation of this index with the mean value of the attachment loss.

Calculus Index

The mean value for the calculus index was of 1.33 ± 0.27 , correlated with the C2 bone cortex class. We noted a positive correlation of this index with the bone alveolar resorption index and also with the mean attachment loss.

Gingival Index

The mean value for the gingival index was of 0.79 ± 0.21 . This index was strongly correlated with the C2 bone cortex class and with the mean attachment loss.

The Bleeding Index

The mean value for the bleeding index was of 2.3 ± 0.38 , correlated with the C2 bone cortex class and with the attachment loss.

Periodontal Probing

The mean value for the periodontal probing for the entire group of 52 participants was of 4.72 ± 1.02 mm. There was not a correlation between the probing depth and the bone resorption index.

The periodontal Attachment Loss

The mean value for the attachment loss was of 4.35 ± 1.01 mm. There was a strong correlation of the mean attachment loss to the C2 bone cortex class. We observed a negative correlation between the mean attachment loss and the bone resorption index. There was a relation between the mean attachment loss and the debris index, calculus index and the gingival index.

The mean values of the clinical parameters and their correlation with the others variables are summarised in Table 1.

Number of Present Teeth

58.7% of the study population have 15-30 teeth present on the dental arches; 27.9% of the participants presented up to 15 teeth and 13.4% of them- more than 30 teeth present on the dental arches (Fig. 2).

Reasons for odontal-periodontal units loss

36.5% of the patients have lost their teeth due to caries, 30.7% - due to periodontal disease and 32.8% of them due to an association of carious lesions with periodontal disease (Fig. 3). Only 3.8% of the study population presented no tooth loss.

CLINICAL PARAMETER	MEAN VALUE	CORRELATION
Debris Index	$1,21 \pm 0,32$	C2 Class; Mean attachment loss
Calculus Index	$1,33 \pm 0,27$	C2 Class; Alveolar bone resorption index; Mean attachment loss
Gingival Index	$0,79 \pm 0,21$	C2 Class; Mean attachment loss
Bleeding Index	$2,3 \pm 0,38$	C2 Class; Mean attachment loss
Periodontal probing	$4,72 \pm 1,02$ mm	The absence of the correlation with the alveolar bone resorption index
Periodontal attachment loss	$4,35 \pm 1,01$ mm	C2 Class; Debris Index; Calculus Index; Gingival Index

Table 1. The mean values of the clinical parameters and their correlation with the others variables

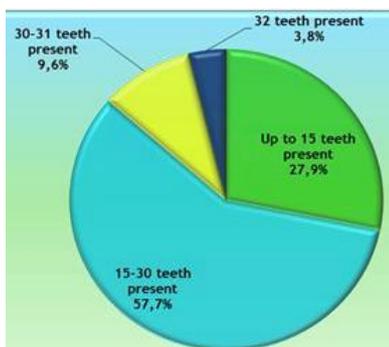


Fig. 2. The groups distribution based on the number of teeth present on the dental arches

Radiograph measurements

Mandibular cortex

The distribution of bone cortex classes was as follows: C1 - 37.6%, C2 - 62.4% and C3 - 0% (Fig. 4). The strongest correlation was between C2 bone cortex class and the age, the debris index, the calculus index and the mean attachment loss.

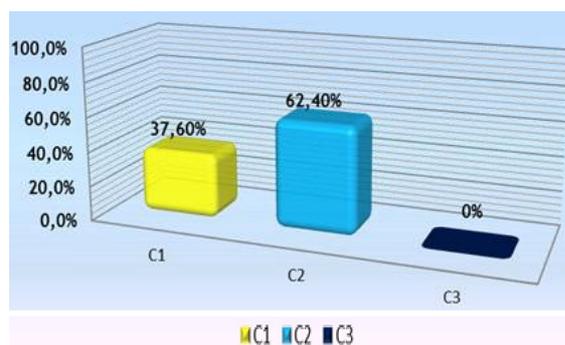


Fig. 4. The bone cortex classes distribution

The alveolar bone resorption index

The alveolar bone resorption index values ranged from 2.4mm to 2.8mm for 63.4% of the cases, with a mean value of 2.56 ± 0.23 mm. This index was strongly correlated with the debris index and the calculus index; a moderate correlation was observed between the alveolar bone resorption index and the gingival index.

Periodontal diagnosis

38.4% of the cases were diagnosed with generalised chronic gingivitis, 23.7% with generalised chronic gingivitis associated with localised periodontitis and 37.9% of the cases- with generalised chronic periodontitis.

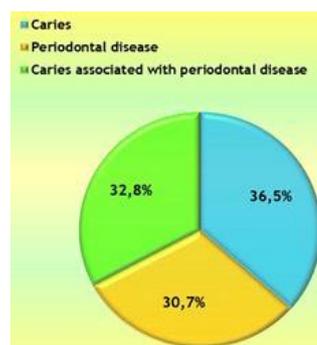


Fig. 3. The groups distribution based on tooth loss reasons

DISCUSSIONS

Osteoporosis and chronic periodontitis have a series of risk factors in common; both of these conditions present a peak after the age of 35 years [4].

The periodontal examination and the radiographs are frequently conducted [13], therefore their clinical signification for observing more periodontal risk factors is extremely high; questions referring to the general skeletal status of the patient may arise.

The study group was a homogenous one, concerning the age, the social-economic status and the environment (rural, urban).

This study results demonstrated that, although almost all the examined subjects presented periodontitis (except 4 of them) the form of periodontitis was superficial to moderate. Only 3.8% of the subjects had all the teeth present on the dental arches, 58.7% of them - 15 to 30 teeth present and 27.9%, up to 15 teeth present on the dental arches.

An important result of this study consists in the strong correlation between the local factors and the periodontal attachment and bone loss. Moreover, the attachment loss was strongly associated with the bone resorption index.

These results confirm the fact that the periodontal status is highly influenced by the local factors. We did not notice a relationship between the alveolar bone loss and the bone mineral density. Also, a relationship between the bone mineral density and the attachment loss was not observed. The results of the

present study come in concordance with those obtained by Paramashivaiah et al. in a study conducted on a group of osteoporotic female subjects in 2011 [8].

Persson et al. evaluated in 2002 in a study conducted on a large number of subjects with osteoporosis the relation between the bone mineral density and the alveolar bone loss [14]; contrary to the present study, they concluded a strong relation between these two variables but their study was based only on radiographs, without the clinical parameters, limiting their results significance.

The limitation of the present study consists in the absence of the data referring to the estrogen and calcium levels of the osteoporosis patients examined. Also, the present study is a

cross-sectional one; it would be important to observe a longitudinal evolution of the patients, to examine the periodontal status before the menopause onset. Of course, it would be relevant to compare the results of the study with a neutral group of examined patients, to observe a larger and clearer image.

CONCLUSIONS

This study demonstrates a strong correlation between the osteoporosis and the periodontal disease; the tight relation between the local factors and the attachment loss is also important. Therefore, the osteoporosis creates favourable systemic conditions for the evolution of the periodontal disease but the former is highly associated with local risk factors.

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