Correlation of OPG and DEXA: A Case Control Study

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ABSTRACT

Introduction: Osteoporosis is a common disorder affecting older females. But it remains undetected in many cases. The aim of the present study is to evaluate the correlation of lower border of mandible of OPG and bone mineral density changes as measured by dual energy x ray absorptiometry.

Material and methods: 30 female patients were subjected to OPG and DEXA. The visual analysis of OPG was done and compared with bone mineral density obtained by DEXA.

Results: It was found that statistically no significant difference was observed between OPG and DEXA technique.

Conclusion: There is a significant correlation between lower border of mandible and bone mineral density. So visual estimation of panoramic radiograph can be used as a screening tool for evaluation of osteoporosis.

Keywords: OPG, DEXA

INTRODUCTION

Osteoporosis is a systemic skeletal disorder characterized by low bone mass and micro architectural deterioration scaffold that results in increased bone fragility and susceptibility to fracture.[1] It is a silent disease, reflected only by a low bone density, till a fracture occurs. As hypertension and dyslipidaemia predisposes to stroke and myocardial infarction respectively, a low bone density predisposes to osteoporotic fractures.[2] According to the consensus report it is estimated that 1 in 3 women and 1 in 12 men over the age of 50 worldwide have osteoporosis.[3] Osteoporosis can be diagnosed based on the signs and symptoms, x-rays, bone scans and bone mineral density (BMD) assessment[4]. But DEXA (Dual Energy X-ray Absorptiometry), is considered as the gold standard for determining osteoporosis but due to the high cost associated with this advanced imaging technique and unavailability of this equipment at many diagnostic centres confines its utility.

Panoramic radiograph is a dental x-ray that is widely used to detect and scrutinize dental diseases and conditions. It is very cost effective as compared to the other advanced imaging modalities. The use of these radiographs for screening individuals with low skeletal bone mineral density would be very economical and beneficial as the dentists can refer the patient for further examination if required.[4]

Osteoporosis is a disorder that has grave consequences if it remains undetected. On the other hand if detected in time serious complications like fracture can be averted. The diagnostic method for osteoporosis is dual energy x ray absorbtiometry but its very costly. The need of the hour is to find any alternative diagnostic option that is accurate and cost effective.

MATERIAL AND METHODS

Thirty post menopausal females reporting to the department of Oral medicine in Hazaribagh Dental College and Hospital were included in this study after obtaining informed consent. Ethical clearance was obtained by institutional review board. Detailed history of the subjects was recorded. The subjects underwent digital panoramic radiographic examination after taking appropriate measures for radiation protection. All the radiographs were analyzed at the lower border of mandible by a single observer who was blinded about the DEXA results. Subjects were advised to undergo DEXA for estimation of bone mineral density of the lumbar vertebrae (L2- L4). The lumbar spine was taken for comparison with panoramic radiograph because assessment of bone mineral density at the spine and femur is considered as the gold standard for diagnosis of osteoporosis. The result obtained from DEXA examination was interpreted using WHO criteria. The radiographic interpretation of OPG was compared with bone mineral density results of DEXA.

RESULTS

Data was entered in Microsoft excel and chi square test was analysed using SPSS version 16.It was observed that 40%
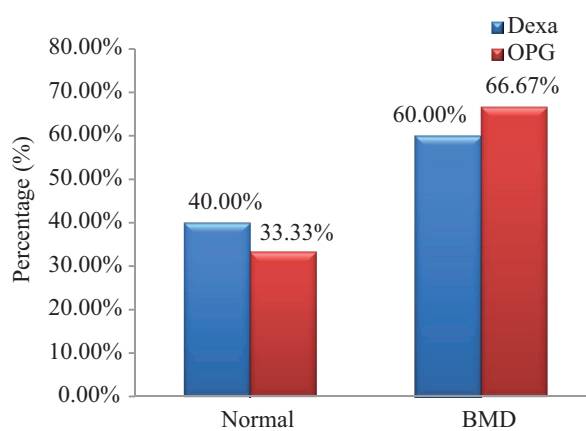
Graph-1: Showing comparison of DEXA and OPG

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patients were normal and 60% had changes in bone mineral density as observed by DEXA technique where as 33.33% were normal with no radiographic changes as measured by OPG. Rest 66.67 had radiographic changes as visualised by OPG. Statistically a non significant difference was observed by comparison of changes in bone mineral density by DEXA and OPG (Chi square = 0.2871, df=1, p=0.5921). This can be seen in graph I. This means that changes observed in the lower border of mandible in OPG can be used as a marker for overall change in bone mineral density.

DISCUSSION

Many indices have been proposed as an indicator for analysis of mandible in OPG.[4,5,6,7] These indices have been divided in two types - radiomorphometric indices and densitometric indices. Radiomorphometric index is based on the visual analysis or morphological study of the panoramic radiograph.[8,9] Densitometric analysis involves quantitative measurements and analysis. In the present study the correlation between an OPG has been made with the DEXA of the lumbar spine region. Several other studies have revealed this beyond doubt that the lumbar and hip DEXA are the best for diagnosing osteoporosis. So in the present study the correlation between the bone mineral densities of the lumbar spine (L2 to L4) was done. Few studies have tried to correlate the m- DEXA (Mandibular DEXA) with panoramic indices but the m-DEXA has not yet been proved to be reliable. The study done by B Cakur[6] et al to check the reliability of mandibular cortical index and mandibular bone mineral density in the detection of the osteoporotic women has made use of m-DEXA and has concluded that no significant correlations were found between skeletal BMD and m-DEXA and mandibular cortical indices. Another study done by Horner and Devlin[10] has also considered m-DEXA and has calculated the mean BMD. Variations in the results obtained raises serious doubt about the use of mandibular DEXA for determination of bone mineral density.

Klemetti et al[11] proposed an index called mandibular cortical index which was used for visual analysis of lower mandibular border. It is a three point index with C1, C2 and C3.

- C1: the endosteal margin of the cortex was even and sharp on both sides
- C2: the endosteal margin showed semilunar defects (lacunar resorption) or seemed to form endosteal cortical residues (one to three layers) on one or both sides.
- C3: the cortical layer formed heavy endosteal cortical residues and was clearly porous.

In the present study only the visual analysis was done and three point indexes were not followed. Gradation system can make it more complicated so a visual analysis to see changes in the lower border of mandible was done in the present study.

CONCLUSION

This study concludes that the visual analysis of the lower border of mandible can be used to distinguish normal subjects and subjects with altered bone mineral density.

Thus patients with significant thinning of mandibular cortex should be referred for further evaluation of osteoporosis by the dentists. This will help in the diagnosis of cases of altered bone mineral density that gets detected only after a fracture occurs.

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