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# Assessment of Volumetric Changes of Alveolar Bone in Geriatric Population

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## ABSTRACT

**Introduction:** Alveolar bone is the part of the maxilla and mandible that supports teeth and fibers of the periodontal ligament.Few changes observed in the bone during aging are being described here in the study.The changes include thinning of bone tissue,increased vulnerability to fractures and also increase in labial alveolar resorption as people age.

**Materials And Methods**: Cone Beam computed tomography (CBCT CS 9600) images were taken from post extraction cases. CBCT images were assessed using the software Care Stream (CS) 3D Imaging.

**Results**: 15 images of the alveolar bone of patients in the age group of 50-60 were obtained .

**Conclusion:** The measurements of the cortical plates and bone width indicate the pattern of resorption of the alveolar bone in the post extraction spaces .

**Keywords:** *Alveolar bone,CBCT, Bone resorption*

## INTRODUCTION

Alveolar bone is the part of the maxilla and mandible that supports teeth and fibers of the periodontal ligament.

Alveolar bone consists of four layers. Apart from three layers found in other bones-(periosteum,dense compact bone,cancellous bone) the alveolar bone consists of a cribriform plate which lines the alveolar sockets.**[6]**

The alveolar bone also has inorganic surfaces that consists of osteoblasts which help in bone formation and also consists of osteoclasts that help in bone resorption during aging.

To analyze the volumetric changes of the alveolar bone in geriatric population there are many techniques used.there are 2D as well as 3D imaging techniques being used globally.**[9]**While evaluation of bones are done using 2d imaging there is overlapping of adjacent anatomical structures seen.

For this study we have used CBCT(Cone Beam Computed Tomography) imaging to detect changes in the alveolar bone. It generates 3D images and is widely used in the field of dentistry. It provides coronal,sagittal,axial images without magnification.

Even panoramic images can be generated.CBCT images can be used to study about the various intra bony defects in a deeper perspective.

Different studies comparing the 2D and 3D techniques have shown that cbct images have higher sensitivity of around 80% while the other 2D techniques show a sensitivity of around 60%only.Also no distortion and overlapping is seen in CBCT images.

Also the ability of interpreting the CBCT images can be used for a wide array of research fields in the near future.It might also help in improving the field of dentistry as a whole as well.

The basic aim of this study is to assess the volumetric changes of the alveolar bone in the geriatric population using CBCT images.

## MATERIALS AND METHODS

Patients belonging to the age group of 50 to 60 years were presented in a private clinic - Saveetha dental college and hospitals to participate in the study to analyze the volumetric changes of the alveolar bone in the geriatric population.15 patients were examined for the study.

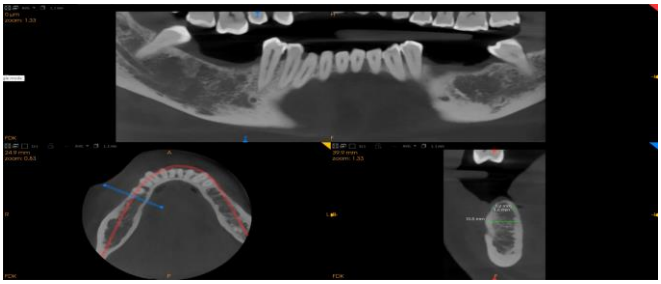
Cone Beam computed tomography (CBCT CS 9600) images were taken from post extraction cases. CBCT images were assessed using the software Care Stream (CS) 3D Imaging.The patients who had metallic restorations like braces were excluded from the study .

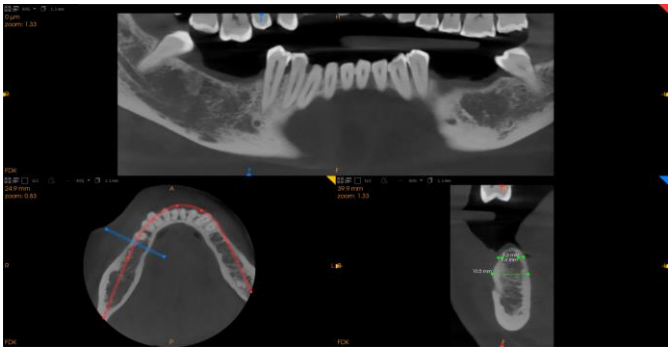
The images were taken from the cbct cs 9600 machine.the machine had an exposure time of 0.5 to 13 s and power supply frequency of 240 khz.

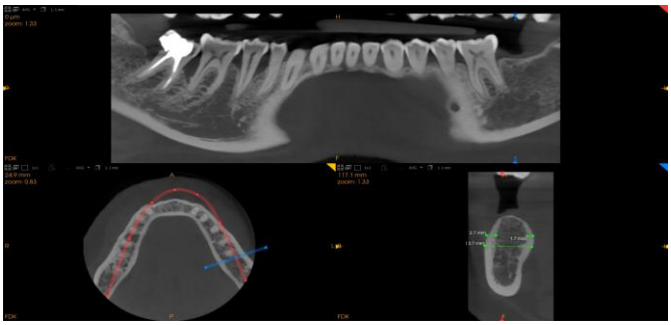
The images were evaluated for the amount of bone resorption in lingual/palatal,buccal,mesial and distal surfaces by measuring the distances from alveolar bone to cemento enamel junction in millimeters.The level of resorption was classified according to the amount of bone loss.

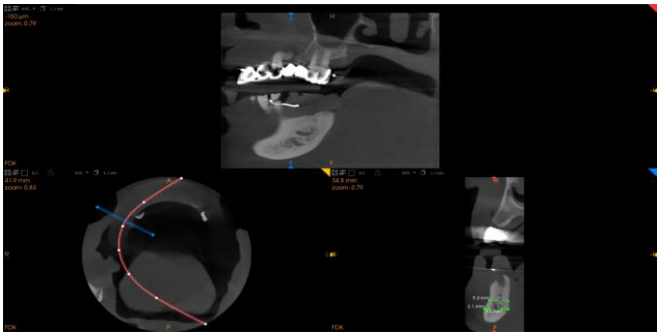
## RESULTS

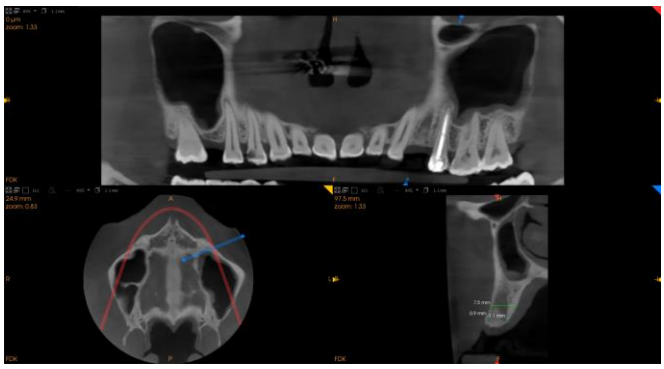
These images show the scanned CBCT images of the post extraction spaces in the alveolar bone socket of 15 patients.











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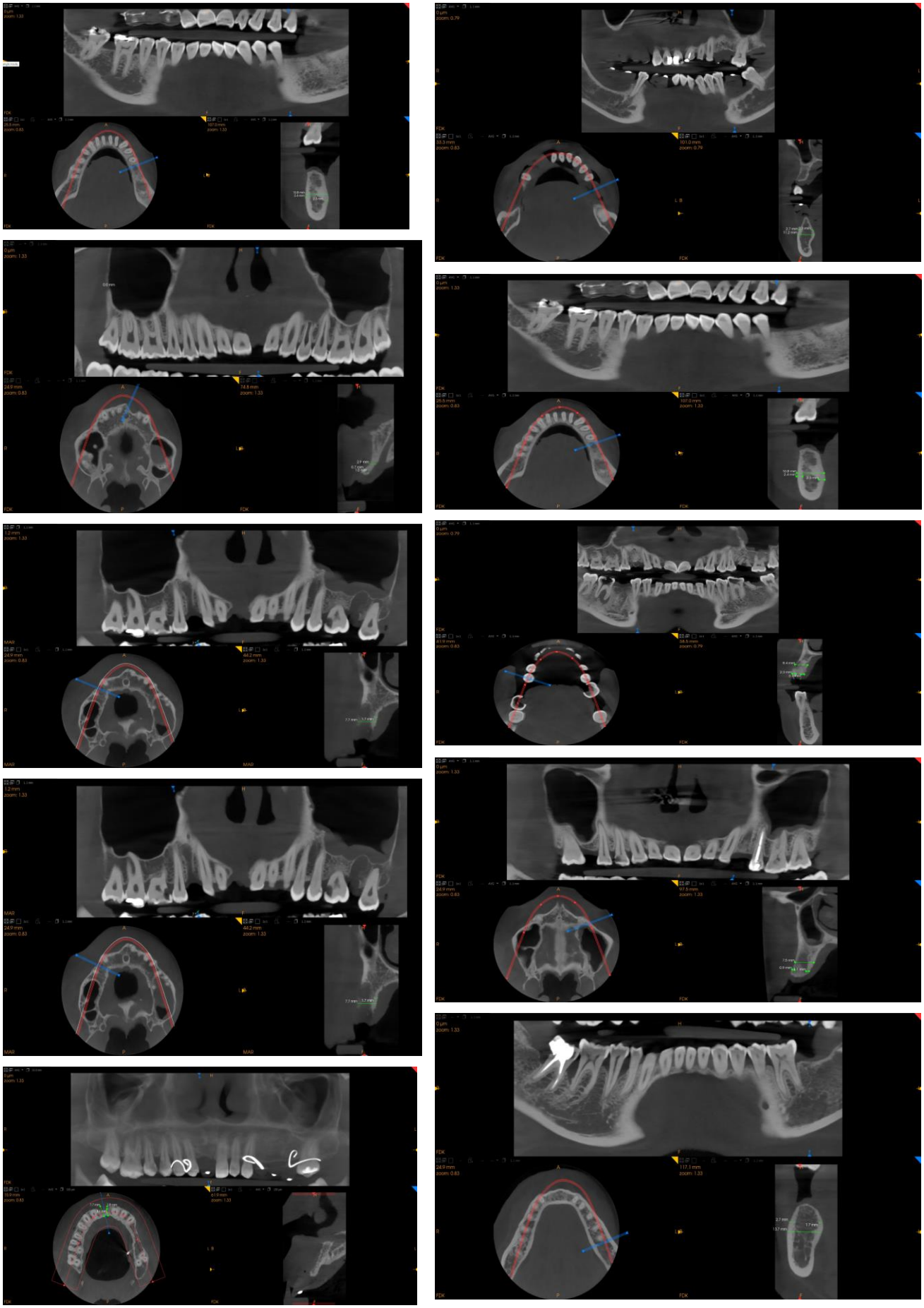

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## DISCUSSION

Various studies have been conducted to detect the accuracy of alveolar bone resorption using a wide array of 2-D techniques,this study is mainly focused on analyzing the volumetric changes in the alveolar bone using CBCT imaging technique.

Some studies have also compared many 2-D and 3-D techniques for the assessment of alveolar bone resorption.The normal bone height is between 1mm to 3mm in absence of any periodontal disease. But if the patient is having any particular type of disease or is aging the bone height starts increasing significantly.

Grimard et al(2009)[3] used the same method to compare the results of intra oral radiograph with cbct after regenerative periodontal therapy.In young adults the bone width is around 0.7 to 1.5mm and as the age increases it may increase to 1.5 to 3mm.

In a study done by De Faria Vasconcelos et a)l in (2012)[10] suggested that the measurements greater than 3mm from the cemento enamel junction to the alveolar crest was considered as bone resorption.

Also in a study done by Balasundaram et al[4] the measurements greater than 3 mm were considered as vertical bone defect.In the present study few data were obtained based on the results.The total bone width was between 2.9mm to 13.7mm.The buccal cortical plate 0.7 to 2.7mm.The lingual cortical plate ranges from 1 to 3.2mm.

CBCT technique was quite efficient in determining these values.it also requires lower doses as compared to other methods.The CBCT images were more clear, had good exposure and field of view when compared to other conventional radiography techniques. **[8]**In order to view periodontal structures like alveolar bone,ligaments,their spaces,cortical and buccal plates higher image quality and small voxel size are needed in cbct.these factors like voxel size affect the measurements and the quality of the scan.

It is very essential to compare this present study with other studies that used conventional radiography techniques to have a better idea and a much clear picture and knowledge of different concepts and techniques.As mentioned before patients who had restorations were excluded from the study as the scans show improper results due to the metallic restoration on the teeth.

CBCT also yielded high sensitivity, accuracy and specificity in the images as well.Hence this method can be used as an aid for a variety of surgical procedures like root canal treatments to measure the canal length or width. And it would also help in improving and providing quality treatment to the patients.

## CONCLUSION

The above mentioned metrics about the total bone width, lingual/palatal plate width, buccal width indicate the pattern of resorption of alveolar bone in post extraction spaces.Resorption dynamics are key in implantology and alveolar ridge preservation techniques.

## CONFLICT OF INTEREST

There is no conflict of interest.

## FUNDING SUPPORT

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