

# **A panoramic evaluation of the mandibular canal wall resorption in relation to Diabetes, Thyroid and Asthma in edentulous patients**

**Kalpesh Vaishnav\*, Dipti Shah\*\*, Pankaj Patel\*\*\***

\*M.D.S, Reader \*\*MDS, Professor and Head, \*\*\*Senior Lecturer, Department of Prosthodontics, Karnavati School of Dentistry, Uvarsad, Gandhinagar, Gujarat.  
Contact: dr\_kalpnita@yahoo.com

## **Abstract:**

Residual ridge resorption is continues processes through the remaining life of the edentulous patient. With residual ridge resorption mandibular canal wall also gets affected, causing dehiscence of mandibular canal. Little knowledge is available regarding the relationship of specific systemic diseases like thyroid, diabetes and asthma, with the amount of residual ridge resorption. So this study was carried out with the following aims and objectives.

1. To assess the status of the mandibular canal in the edentulous mandible.
2. To discover relationship between resorption of the borders of the mandibular canal and specific systemic diseases like thyroid, diabetes and asthma with gender variation.
3. To assess the cortical bone thickness in the region of angle of mandible in relation to specific systemic diseases like thyroid, diabetes and asthma with gender variation.

*Keywords:* Mandibular canal wall Resorption, asthma, diabetes, thyroid, gender, cortical bone thickness.

*P- ISSN*  
*0976 – 7428*

*E- ISSN*  
*0976 – 1799*

*Journal of  
International  
Oral Health*

Prosthodontics

Original Research

## **Bibliographic listing:**

EBSCO Publishing  
Database, Index  
Copernicus, Genamics  
Journalseek Database

## Introduction:

It is a normal function of bone to undergo constant remodeling throughout the life by the process of bone resorption and bone formation. Except during growth, when bone formation exceeds bone resorption, both are normally in equilibrium. As the age advances this equilibrium is lost and thus bone resorption exceeds bone formation.

Residual ridge resorption is not a disease, but a normal physiologic process which continues throughout the remaining life of the patient. This continuous resorption of residual ridge makes the patients "dental cripples ". With this process of residual ridge resorption, mandibular canal wall also gets affected, causing dehiscence of mandibular canal. Residual ridge resorption is probably of a multifactorial origin. The mandibular canal and the mental foramen have been used to distinguish an alveolar process from the basal bone in mandible. So, the main aim of this study to predict which patients are likely to loose a greater amount of bone is important for prognosis and treatment planning. This study presents the associations of resorption of the mandibular canal wall, due to progress of residual ridge resorption, with gender, asthma, thyroid disease and diabetes.

## Materials and methods:

For this study, 130 subjects were selected after an oral and radiographic examination. Data on the subject's general health condition were obtained from the records, in which the subjects underwent a structured interview by public health nurse and a clinical examination by a physician. Panoramic radiographs were taken with a panoramic apparatus. Step by step procedure for this study, for the exposures of a panoramic film were

includes equipment preparation, patient preparation and positioning.

Three radiographs were excluded because of image distortion; therefore 127 subjects (64 women and 63 men) were assessed.

The status of the mandibular canal on each side of the edentulous mandible was graded according to following criteria.

Grade 0: The crest of the residual ridge above both the mental foramen and mandibular canal.

Grade I: The crest of the residual ridge above the mandibular canal and the mental foramen at the top of residual ridge with or without a partially resorbed border.

Grade II: The superior border of the mandibular canal at the top of residual ridge and the mental foramen with or without a partially resorbed border.

Grade III: The superior border of the mandibular canal partially resorbed and the borders of the mental foramen totally resorbed.

Each radiograph was viewed on a standard light box, and the status of the mandibular canal was assessed by one examiner. 15 mandibular canals were invisible in a total of 254 mandibular halves.

The cortex thickness at the mandibular angle was assessed on both sides of the mandible from panoramic radiograph. Acetate paper was stabilized on OPG film (radiograph). Two tangential lines were drawn, one touching the lower the lower borer of mandibular body and angle of mandible and the second one posterior border of ramus and posterior border of condyle. The angle formed by these two lines was measured and bisected. The bisecting line

will make a point at the angle of the mandible. The cortex thickness was measured from this point with help of a vernier caliper. The mean value for each subject was used in the analysis of the radiographs. The systemic factors considered in this study were those that were likely to be related to severe reduction in the mandibular residual ridge.

The Performa for selected patients:

Name:            Age:            Gender: Male/Female

Duration of edentulousness:

Group I: 1 to 10 years

Group II: 10 to 20 year

Group III: 21 to 30 year

Group IV: Greater than 3 year

Thyroid diseases: Yes/No    Diabetes: Yes/No

Asthma: Yes/No

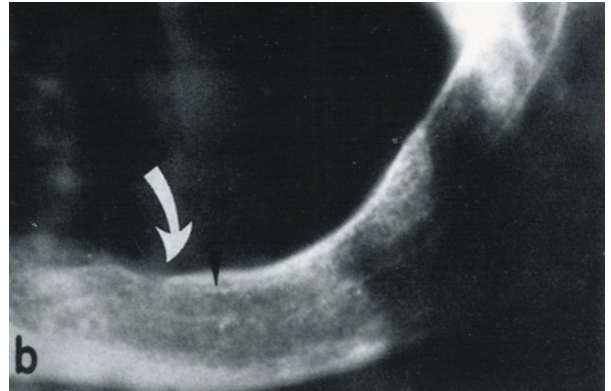
Status of mandibular Canal: Grade: 0/I/ II/ III

Cortex thickness at the mandibular angle: < 1 mm, ≥ 1 mm.

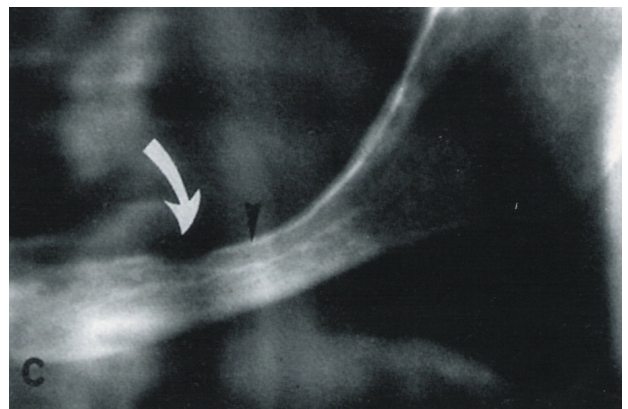
All the data and results were subjected to statistical analysis by mean and chi-square formula: Mean was obtained by summing up the measurements and dividing the total by the number of measurements.



Grade 0:- The crest of the residual ridge above both the mental foramen and mandibular canal.



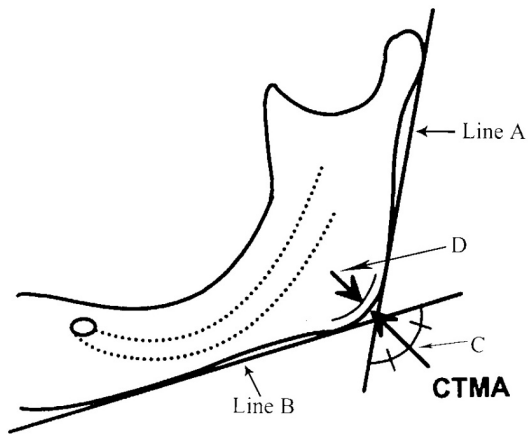
Grade I: The crest of the residual ridge above the mandibular canal and the mental foramen at the top of residual ridge with or without a partially resorbed border.



Grade II: The superior border of the mandibular canal at the top of residual ridge and the mental foramen with or without a partially resorbed border.



Grade III: The superior border of the mandibular canal partially resorbed and the borders of the mental foramen totally resorbed



Photograph showing cortical thickness at the angle of mandible

Line A :- Tangent touching posterior border of ramus and condyle.

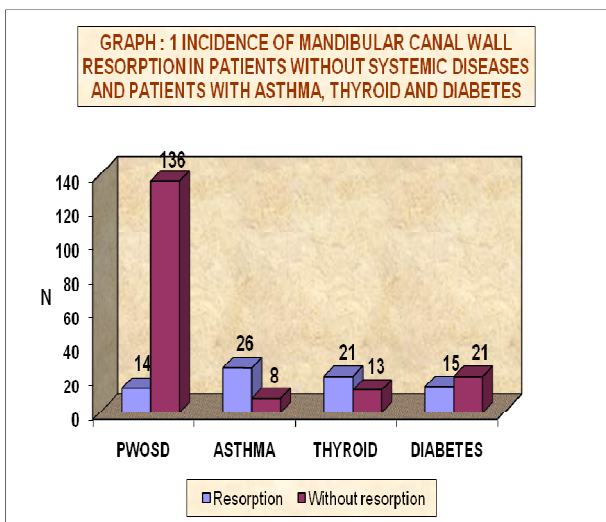
Line B :- Tangent touching the lower border of body and angle of mandible.

Arrow C & D: Shows the cortical thickness at angle of mandible

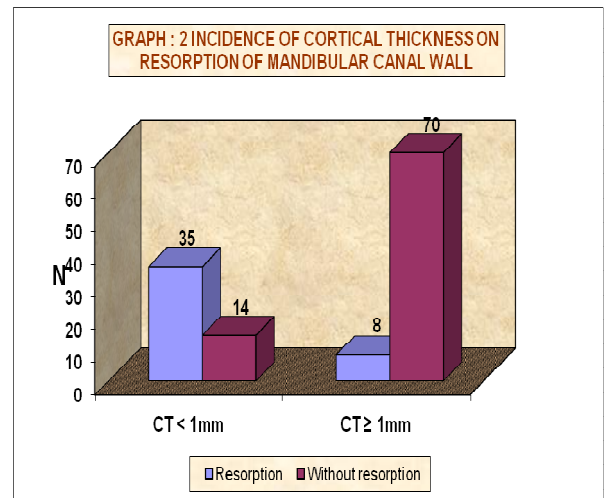
CTMA: Cortical thickness at mandibular angle

**Results:**

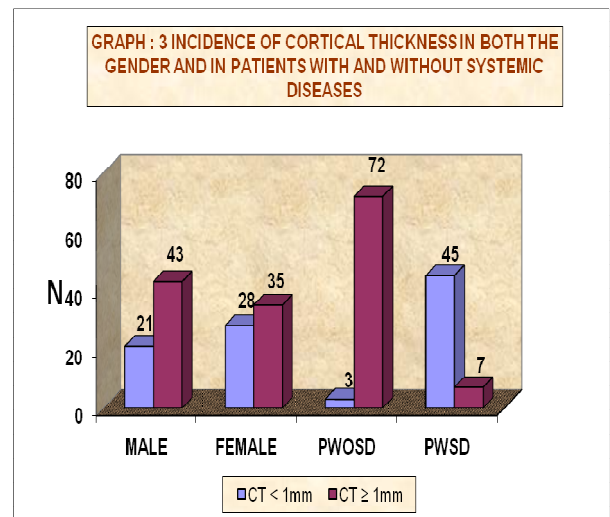
This study was carried out to evaluate the mandibular canal wall resorption in patients with and without systemic diseases like diabetes, thyroid and asthma. For this study 127 subjects were selected.



Graph 1: Incidence of mandibular canal wall resorption in patients without systemic diseases and patients with Asthma, Thyroid and Diabetes.



Graph 2: Incidence of cortical thickness on resorption of mandibular canal wall.



Graph 3: Incidence of cortical thickness in both the gender and in patients with and without systemic diseases

The result of this study showed, that females and patient who have < 1mm cortical thickness at mandibular angle are more prone to the resorption of mandibular canal. Among the patients with systemic diseases, asthmatic patient showed more resorption.



## Discussion:

Resorption is defined as the loss of substance through physiologic or pathologic means. Research on bone resorption and its mechanism has importance in four areas: the regulation of calcium homeostasis in the body, the integrity of the skeleton as a structural unit, the treatment of metabolic diseases, and the understanding of localized bone resorption. The term ridge resorption has come to mean the loss of volume, the change in shape and the loss of strength of residual alveolar ridge.

Oral bone loss is a major cause of morbidity in the aging population. The factors that cause or influence loss of the edentulous alveolar ridge are local factors, factors causing disturbances in vascularization and causing disturbances in bone mineral metabolism, leading to a loss of bone volume i.e. metabolic bone loss. In this radiologic study, resorption in the mandibular canal was evident when the mental foramen was completely resorbed and superior border of the mandibular canal was partially lost in the region of the top of the residual ridge. In this study, in women and subjects with thin cortex, residual ridge resorption tends to involve the basal bone of the mandible and also involves borders of the mandibular canal, leading to exposure of the mandibular nerve, which possibly demonstrated the effect of systemic and hormonal factors that affect females, causing osteoporosis which leads to residual ridge resorption. Systemic diseases such as hyperthyroidism, diabetes and asthma and certain medications such as corticosteroids and thyroxine influence mineral metabolism in the body and may cause a generalized bone loss. Hyperthyroidism increases metabolic rate so that a negative nitrogen balance results. Such a balance leads to protein deficiency which can cause osteoporosis and generalized bone loss. In patients with hypothyroidism, administration of drug like thyroxine can influence the kidney, causing increased excretion of calcium and phosphorus. This depletion of calcium and

phosphorus results in decreases bone apposition and increases osteoclastic activity. In diabetes mellitus insufficient insulin causes the improper utilization of glucose. The finding of this study that asthma, diabetes and thyroid disease are associated with resorption of the mandibular canal wall seems to indicate that these diseases or the medications used for their treatment affect the edentulous mandible more. Besides their systemic influence on bone, corticosteroids administered to asthmatic patients by means of inhalation may cause a relatively high concentration of these agents in the mouth, possibly resulting in a local effect on the maxillae and mandible. Systemic diseases such as hyperthyroidism, diabetes and asthma and certain medications such as corticosteroids and thyroxine influence mineral metabolism in the body and may cause a generalized bone loss. Thus, from the result of this study, a prosthodontist should try to maintain and to prevent the further resorption of the residual alveolar ridge by modifying routine prosthodontics procedures, especially for asthmatic patients.

Conclusion:

- 1) The resorption of the wall of mandibular canal is found more often in edentulous women than in the men due to hormonal imbalance. The superior border of the canal is found to be affected more commonly in all the female patients. The resorption of inferior border of the canal is also found, but is not well demarcated on the radiographs.
- 2) The resorption of mandibular canal is more in patients with systemic disease as compared with those without systemic diseases.
- 3) Among the patients with systemic diseases, asthmatic patients have a greater mandibular canal resorption potential compared to diabetic and thyroid patients.
- 4) Similarly, the cortical thickness is lower in patients with systemic disease compared to subjects without systemic disease and patients

with asthma are more inclined towards decreased cortical thickness.

This study does not include the effect of nutrition and diet of the patients with systemic diseases on the resorption of alveolar bone. Thus further studies can be carried out to find out the effect of nutrition and diet which may reduce the rate of resorption for patients with systemic diseases.

#### References:

- (1) David j. Baylin, Kebhu yamamoto, Eberhard manzke. Systemic factors in alveolar bone loss, J Prosth Dent 1974; 31:486-505.
- (2) Douglass Allen Atwood: reduction of residual ridges a major oral disease entity. J Prosth Dent 1971; 26; 266-279.
- (3) J bras. Mandibular atrophy and metabolic bone loss. Int Dent J, 1990; 40; 298-302.
- (4) Massler M: tissue changes during ageing. Oral Surg, 1956; 9; 1185-1196.
- (5) Wical. K. E: studies of residual ridge resorption part-II the relationship of dietary calcium and phosphorus to residual ridge resorption. J Prosthet Dent 1974; 32; 13-22.
- (6) E. Zmystowka, S. Ledzion, K. Jedrzejewski. Factors affecting Mandibular residual ridge resorption in edentulous patients: a preliminary report. Folia Morphologica 2007 vol.66, No. 3, PP 346-352.
- (7) Dubravka Knezovic-Zlataric, Asja Celebic, Biserka Lazic. Resorptive changes of maxillary and mandibular bone structures in removable denture wearers. Acta Stomat Croat 2002; 261-265.
- (8) Xie QF, Ainamo A. Association of Mandibular angle size with cortical thickness and residual ridge height of the edentulous mandible. Zhonghua Kou Qiang Yi Xue Za Zhi, 2004 sep; 39(5): 390-4.