ISSN: 0976-3031

Available Online at http://www.recentscientific.com

CODEN: IJRSFP (USA)

International Journal of Recent Scientific Research
Vol. 9, Issue, 4(A), pp. 25529-25532, April, 2018

International Journal of Recent Scientific Research

DOI: 10.24327/IJRSR

Research Article

ANALYSING THE RESIDUAL RIDGE MORPHOLOGYAND RESORPTION FOR TREATMENT OF EDENTULOUS PATIENT WITH COMPLETE DENTURE IN MELMARUVATHUR POPULATION

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DOI: http://dx.doi.org/10.24327/ijrsr.2018.0904.1876

ARTICLE INFO

Article History:

Received 17th January, 2018
Received in revised form 21st February, 2018
Accepted 05th March, 2018
Published online 28th April, 2018

Key Words:

Complete denture, mandible, mental foramen, panoramic radiography, residual ridge resorption.

ABSTRACT

Objectives: To determine the residual ridge morphology and resorption for treatment of edentulous patient with complete denture in Melmaruvathur population.
Methods: 100 completely edentulous subjects with age between 45 – 75 years have been included in the study. A standardized panoramic radiograph was made for all patients. Measurements were made digitally using RadiAntDicom viewer software and the amount of resorption was calculated using the Wical and Swoope method. Statistical analysis was done using NPar test and MannWhiteney analysis. Level of significance was set at 0.02.
Result: According to Wical and Swoope classification, study subjects were divided and results were obtained. class I-Mild resorption, Class II-moderate resorption. Class III-severe resorption and the frequency is 0,25,75 respectively. When comparing the age groups, there were increase in rate of resorption with increase in the age. The results were found to be less statistically significant (p value is 0.002). When comparing the gender, the resorption rate is increased in females than males.
Conclusion: With an increase in age, there is an increase in the amount of residual ridge resorption. The amount of resorption in females is found to be more than that of males.

INTRODUCTION

Residual Alveolar Ridge is the absence of teeth after extraction of teeth where the bone starts to resorb. The maxilla and mandible resorbs differently by which the maxilla becoming narrower or decreasing in width and the mandible become wider .Residual Ridge Resorption is greater during first few months after the tooth extraction. Later the rate of resorption is twice more pronounced in mandible than maxilla[1,2]. Immediately following the extraction any sharp edges remaining are rounded off by external osteoclastic resorption leaving a high well rounded residual ridge. As resorption continuous from the labial and lingual aspect, the crest of the ridge become increasingly narrow ultimately becoming the knife edge as the process continues when knife edge become shorter or even eventually disappears leaving a low well rounded or flat ridge eventually this resorbs leaving a depressed ridge.

Etiology of residual ridge resorption is multi factorial according to Atwood and *et al*, the factors related to rate of resorption is divided [3] into anatomic factors, prosthetic factors, metabolic and systemic factors[4]

Anatomical factors [4]

1. More important is the mandible verses maxilla
2. Short and square face associated with elevated masticatory forces
3. Alveoloplasty

Prosthodontic factors[4]

1. Intensive denture wearing
2. Unstable occlusal condition
3. Immediate denture treatment

Metabolic and systemic factor [4]

1. Osteoporosis
2. Calcium and Vitamin supplements

The consequences of residual ridge resorption includes loss of sulcus depth and width, transformed facial esthetic, altered

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vertical dimension of occlusion, altered inter arch relationship ,all of which bear some success of denture[5].

There are several method devised to measure the residual ridge resorption like cephalometric roentgenogram, dento-contourgraph, comparator used with the help of the cart, photogrammetric method, measuring calipees, visual analogue scale[6]. The method used in this study is the orthopantomographic method which was initially described by Wical and Swoope. It is a simple and useful method to estimate the amount of RRR in a given patient at a particular time. Several authors[7,8], after surveying anatomic specimens, have affirmed that the relationship of the foramen to the inferior border of the mandible remains relatively constant in spite of increasing age or resorption of the alveolar process above the foramen. Panoramic radiographs (OPG) were used by several investigators[9-11]as they can be used to visualize a greater area of hard tissues, thus allowing a more accurate localization of the mental foramen in both the horizontal and vertical dimensions[12]. Advantages of using panoramic radiographs are that as panoramic radiographs are often part of the routine examination of patients, their use for research purposes does not involve the patient of any additional exposure or cost, and panoramic radiographs are also likely to be found in records going back several years; and hence constitutes a source of data for a retrospective study[13].

Several studies have been done so far to evaluate the variations of mandibular RRR with either age or gender however not many studies have been conducted all the two factors and their interrelationship. Hence the present study was undertaken to determine the variation of mandibular ridge resorption with respect to classification, age, gender and to evaluate the relative impact of three factor on the amount of resorption as it will be useful in appropriate treatment planning for the patient.

MATER IALS AND METHODS

Ethical approval

The study protocol was approved by institutional review board in our college and the study was conducted in the Department Of Prosthodontics In Adhiparasakthi Dental College And Hospital, Melmaruvathur.

Armamentarium used

1. Digital OPG machine
2. Standardized digital OPG
3. Dicom viewer software

Source of data

This study was carried out on 100 completely edentulous subjects comprising both males and females selected from the patients who are visiting the prosthetic department

Selection criteria

Inclusion criteria

1. Recently extracted site
2. Previous denture wearer
3. Age upto 75 years
4. Underwent any prosthetic surgery

Exclusion criteria

1. Maxillectomy
2. Mandibulectomy
3. Cleft lip and palate
4. Resected maxilla and mandible

METHODOLOGY

All subjects participated in the study were informed and taken a standard Panaromic radiograph OPG was taken using the standard Sirona OPG machine. All images were made by the same operater according to standardization protocol.

The resorption were measured by Plameca viewer. According to Wical and Swoope. Resorption index (IC/IM) was calculated[6]. IC is the distance between the interior ridge of the body of the mandible and the ridge of the alveolar part adjacent to the mental foramen (Fig 1) and IM is the distance between the lower ridge of the mandible body and inferior margin of the mental foramen (Fig 2).

Amount of RRR was calculated according to formula $R=3X-L$.R is the amount of mandibular RRR. X is the distance from inferior border of the mandible to the inferior border of mental foramen. L is the measured height of mandibular residual ridge. The values were obtained and recorded. By this value we determined the classification of resorption

According to Wical and Swoope[6],R>2.34 – class I – Mild resorption .R> 1.67 to 2.33 – classII - Moderate grade of resorption. R<1.66 – ClassIII –severe grade of resorption Subjects were divided based on their age and correlated with age and gender by a statistical analysis test using a NPar test, Mann whitney test.

RESULT

According to Wical and Swoope classification, our subjects were divided and results were obtained. It was found as: class I – Mild resorption frequency is 0. Class II – moderate resorption frequency is 25.classIII – severe resorption frequency is 75.

When comparing the age groups, an increase in rate of residual ridge resorption was found with increase in the age of the subjects, and this difference was found to be less statistically significant(p value is 0.002)(Table 1).

When comparing the gender, the resorption rate is increased in females(Table 2) more than that of males.

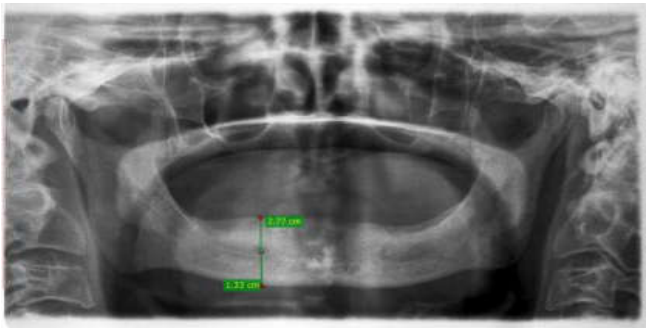

Fig 1 Measurement of distance from inferior border of the mental foramento inferior border of mandible

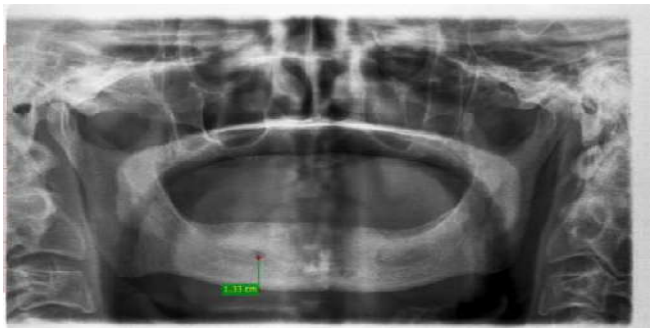

Fig 2 Measurement of distance between anterior and inferior border of the mandible

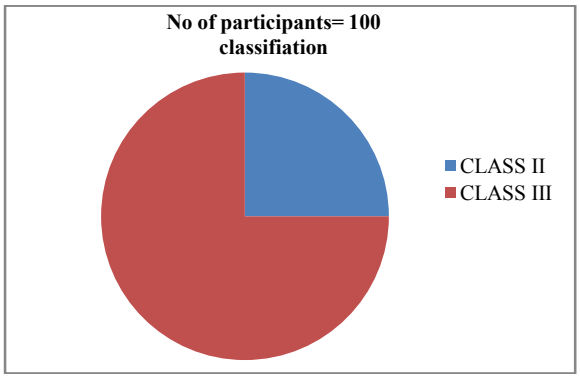

Table 1 Amount of mandibular residual ridge resorption with respect to age

	Total Number	Mean	Std. Deviation
AGE	100	62.68	6.809
RATE	100	21.6202	4.93092

Table 2 Amount of mandibular residual ridge resorption with respect to gender

	Gender	Number	Mean rank	Sum of ranks
RATE	Female	56	52.14	2920.00
	Male	44	48.41	2130.00

DISCUSSION

Gross resorption of the edentulous mandibular alveolar process resulting in excessive loss of denture bearing ridge is one of the most difficult restorative problems for the prosthodontist (Nahri *et al*)[14]. Residual ridge resorption can be measured by different methods of which the most commonly used is the Wical and Swoope method[6]. As the distance between the mental foramen and inferior border of mandible (x) is found to be constant and as the actual mandibular height is found to be 3 times the distance between foramen and inferior border, the amount of resorption can be calculated by using the formula R=3x-L, where L is the measured height of the mandible[15]. The result of this study showed that the amount of mandibular ridge resorption increased with increase in age which was less statistically significant.

Similar results were obtained in the study by Atwood and coy[3], Lopez – Roldan *et al*[10], Hirai *et al*[8] who did not find any significant correlation between age and ridge resorption. The lack of correlation observed in these studies may be because of measuring rates of bone resorption in different age groups either immediately after extraction of teeth or shortly after. However, in studies that were conducted for many years, bone resorption continued throughout the whole period of observation and was found to have a positive correlation with age.

It was found that resorption was more in females than in males. These findings are in agreement with several studies which had also reported that females have more alveolar RRR than males [Bianchi & Sanfilippo[16] (2002), Lopez-Roldan *et al*[10] (2009), Al-Jabrah[5] (2011), Baat *et al*[17]. Kordatzis *et al* [12](2003) reported that the estimated average reduction in height for conventional CD was 1.63 mm in 5 years and that female gender was a risk factor for greater resorption. Solar *et al*, also revealed that female gender was an independent risk factor for more severe bone resorption. Rusiniak-Kubik *et al*[18], reported an increase in mandibular residual ridge resorption in the course of the life of an edentulous patient and double the incidence of severe atrophy in females as compared with males. Increase in residual ridge resorption in females could be explained with the effect of the menopausal activity. After menopause, a deficiency of estrogen hormone was observed, which accelerated skeletal bone loss and resulted in rapid alveolar bone resorption[19]. The mechanism of this phenomenon was confirmed in further experimental studies, which revealed that estrogens induce apoptosis of osteoclasts. Hence estrogen deficiency prolonged the life span of osteoclasts and, thereby contributed to more intense bone resorption[20].

The results of the study showed that, in females, as age increased the increase in amount of resorption was not found to be statistically significant which is in accordance with the study done by Narhi *et al*[14], but is in contrast to the studies by Humphries *et al*[21], who stated that age of the subject was found to significantly affect RRR This might be because of the age of the subjects included in the studies. The former studies included women of mostly in the post-menopausal age range whereas women of both premenopausal and postmenopausal age group were included in the latter studies.

In males as age increased there was an increase in the amount of resorption which was statistically significant. These findings are in agreement with the study done by Bairam *et al* [22] who found that in males, the mean ratio of alveolar bone height tended to decrease with age. This may be because of the decrease in the bone mineral density with age, which predisposed to increase in amount of RRR.

CONCLUSION

Within the limitations of the present study and on the basis of the results obtained it can be concluded that

- With an increase in age, there is an increase in the amount of resorption
- The amount of resorption in females is found to be more than that of male

Applications of the present study

The results of the present study can be used for the appropriate treatment planning of the patient.

Limitations of the study

One of the limitations of this study was small sample size which may not represent the group completely. In addition, the method used gives information about RRR localized in the region of mental foramen, thus RRR in other areas were not assessed. Moreover the evaluation of residual ridge resorption was based mainly on panoramic radiography and clinical factors like occlusal contacts and chewing habits were not assessed.

Acknowledge

The author wish to thank the participating patients and the involved staff at the department of prosthodontics and Crown and Bridge in Adhiparasakthi Dental College And Hospital, Melmaruvathur

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How to cite this article:

Venkatesan N *et al*.2018, Analysing the Residual Ridge Morphologyand Resorption for Treatment of Edentulous patient with Complete Denture in Melmaruvathur Population. *Int J Recent Sci Res.* 9(4), pp. 25529-25532.
DOI: http://dx.doi.org/10.24327/ijrsr.2018.0904.1876