



## EVALUATION OF MANDIBULAR RESIDUAL SURFACE AREA IN INDIAN POPULATION: A PILOT STUDY

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Conflicts of Interest: Nil

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### Abstract:

**Introduction:** Mandibular residual ridge surface area is an important parameter which accounts for the denture support in the patient's mouth. This pilot study was done to determine the average residual ridge surface area of Indian population; both males and females.

**Materials and Method:** The mandibular denture was obtained from the subject and silicon rubber based impression material was adapted on to the intaglio surface of the denture. The denture base area corresponds to the residual ridge surface area of the individual. Once the material has set completely; it was retrieved. A graph paper was adapted over the positive replica of the residual ridge to determine the surface area in mm<sup>2</sup>.

**Result:** The mean surface area of mandible for male is 27.38mm<sup>2</sup> and that of female is 23.46mm<sup>2</sup>.

**Conclusion:** Mandibular residual ridge surface area of males is greater than that of females among Indian population.

**Keywords:** Completely edentulous, Masticatory efficiency, Mandibular residual ridge surface area

### Introduction

Post tooth extraction, a cascade of inflammatory reactions is activated immediately. The extraction socket is temporarily sealed by blood clots and epithelial tissue proliferates and migrates within the first week restoring the integrity. Active bone formation is seen as early as 2 weeks after the extraction and the socket is progressively filled with newly formed bone within 6 months.

The most striking feature of the extraction wound healing is that even after the healing of wounds, the bone undergoes a lifelong catabolic remodeling. The size of the residual ridge reduces rapidly in the first six months and continues throughout life at a slower rate, resulting in removal of a large amount of jaw structure. This unique phenomenon has been described as residual ridge resorption<sup>[1]</sup>.

Shapes and sizes of residual ridges are categorized into common residual ridge configuration in a system of six orders given by Atwood<sup>[2]</sup>

Order I - Pre-extraction.

Order II- Post-extraction.

Order III- High, well rounded.

Order IV- Knife-edge.

Order V- Low, well-rounded.

Order VI- Depressed.

Mandibular residual ridge surface area is an important parameter which accounts for the denture support in the patient's mouth. This pilot study was done to determine the average residual ridge surface area of Indian population; both males and females.

### Statement of the problem

The average mandibular residual ridge surface area is not recorded among the completely edentulous Indian population.

### Materials and methods

The pilot study was carried out at Department of Prosthodontics, JSS Dental College and Hospital, A Constituent College of JSS Academy of Higher Education and Research, Mysore, Karnataka after obtaining the institutional ethical clearance. 30 subjects were recruited from the out-patient section for the study. 15 men and 15 women were selected after obtaining their informed consent. Subjects who were satisfied denture wearers for the past 6 months and who has signed an informed

consent were included in the study and subjects with maxillofacial defects and with metallic denture base were excluded. The subjects were asked to rinse thoroughly to remove all the remnants of food materials from their mouth.

The mandibular denture was obtained from the subject and silicon rubber based impression material was adapted on to the intaglio surface of the denture. The denture base area corresponds to the residual ridge surface area of the individual. Once the material has set completely; it was retrieved. A graph paper was adapted over the positive replica of the residual ridge to determine the surface area in  $\text{mm}^2$ . The reading of each subjects were recorded by two observers to avoid error and the average was obtained.

After the data collection, the results were tabulated and statistically analyzed. Descriptive statistics was used to obtain mean and the standard deviation among the test results. Data was analyzed using SPSS 22 software for Windows.

## Result

Table 1 shows the descriptive statistics analyzed separately for male and female subjects. Among the male subjects surface area was between 15.46 and 33.75 sq cm and the mean surface area of the mandibular residual alveolar ridge in males is 27.378 with a standard deviation of 5.219 and standard error of 1.347. The mandibular surface area (mean) of female subjects is 23.46 with a standard deviation of 3.69 and standard error of 0.955. Among the female subjects the mandibular surface area varied from 17.14 to 29.03 sq cm. The mean of the total observation for the surface area was 25.41 and standard deviation of 4.87.

## Material Required For Surface Area Measurement



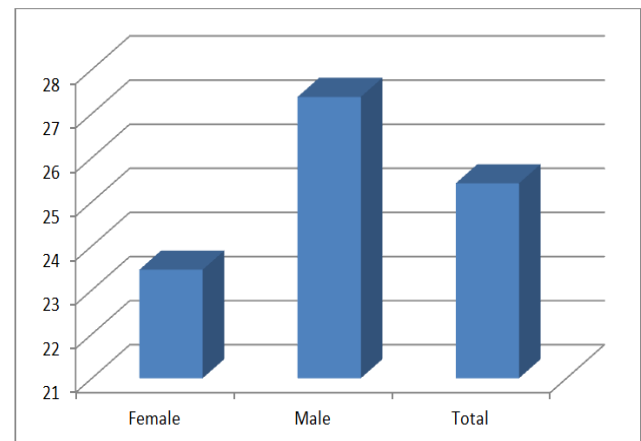
a. Graph paper and silicon base impression material



b. Surface area measurement using graph paper.

**Table 1: Group Statistics between male and female subjects**

	Gender	N	Mean	Standard Deviation	Standard Error Mean
Surface Area	Male	15	27.3787	5.21990	1.34777
	Female	15	23.4600	3.69917	.95512



**Graph 1: Variation in surface area among females, males and total subjects studied**

## Discussion

Atrophy of residual ridges reduces the amount of denture support and is a very disadvantageous process. The present study was aimed at determining an average mandibular residual ridge surface area of the Indian population. The subjects recruited for the study were all denture wearers since 2-3 years from the date of study. The subjects chosen for the study were using the denture for atleast 6 months and had no complaints regarding the denture. So it can be judged that the replica of the intaglio surface of the denture represents the appropriate denture foundation.

The surface area was determined using a commonly available graph paper instead of the digitizer<sup>[3,4]</sup> used in previous studies to obtain the total surface area in

mm<sup>2</sup>. This is an easy and inexpensive chair side method to obtain the surface area and the accuracy of this method is ensured by recording the reading with the help of blinded observers.

The result of the present study is in par with the study done by Hana Al AlSheikh et al<sup>[5]</sup> which has suggested greater mandibular bone height for male compared to female patient. Crum and Rooney<sup>[6]</sup> measured a mean vertical bone loss in the anterior of the mandible of 5.2 mm after 5 years for immediate dentures compared with 0.6 mm for immediate over dentures, so immediate denture patients were excluded from the study.

Mandibular residual ridge was measured instead of maxillary because there is tendency for more RRR in mandible than maxilla. Woelfel et al<sup>[7]</sup> found that maxillary denture area is 4.2 sq. inch while the mandibular denture has got 2.3 sq inch. The ratio is 1.8:1. So the amount of bone resorption is more in mandible because higher load per unit area.

The result of the present study is similar to the study done by Koshino et al<sup>[3]</sup> which suggests that residual ridge resorption will more strongly occur in females compared to males. Mandibular residual ridge area was measured taking into account the observation done by Koshino et al<sup>[3]</sup> which states that the basal area as the denture bearing area will not change so much, although height will reduce due to aging or mechanical force. This study is first of its

kind to measure the residual ridge surface area of Indian population and categorize it on basis of gender.

### Conclusion

The data collected during the study suggests a variation mandibular residual ridge surface area between genders of the subjects. The mean surface area of mandible for male is 27.38mm<sup>2</sup> and that of female is 23.46mm<sup>2</sup>.

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