



Difference in height of maxillary alveolar ridge on edentulous women and dentate women using panoramic radiography

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Article History:

Received on: 09.10.2018

Revised on: 07.03.2019

Accepted on: 10.03.2019

Keywords:

Maxillary alveolar ridge,
Dentate women,
Edentulous women,
Panoramic radiography

ABSTRACT

The height of the maxillary alveolar ridge can be measured using panoramic radiography. The decline occurred because the height of the alveolar ridge undergoes slow physiological resorption due to the absence of mechanical stimulus. The purpose of this research is to know the difference and the average height of the maxillary alveolar ridge in edentulous and dentate women using panoramic radiography. This study is an analytical method with a cross-sectional approach. A total sample of 40 women, edentulous and dentate has been measured. Measurements were made by measuring the distance between the lowest point of the infraorbital ridge and alveolar crest maxilla on the incisor point, right and left premolar, right and left molar. A statistical test is done using independent t-test. The results showed that the average value of a dentate women sample is greater than edentulous. The average value obtained by the dentate sample is greatest in incisor point by 37,57mm ± 3,34mm and the smallest at the right molar point by 33,87mm ± 2,81mm. The average value obtained by the edentulous sample is greatest in incisor point by 35,30mm ± 2,79mm and the smallest at the right molar point by 31,84mm ± 3,85mm. It can be concluded that there is a significant difference in the height of the maxillary alveolar ridge on an edentulous sample and dentate, except the right molar teeth. The average height of the maxillary alveolar ridge in an edentulous sample is 33,35mm ± 3,43mm, and the dentate sample is 35,66mm ± 3,21mm.

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ISSN: 0975-7538

DOI: <https://doi.org/10.26452/ijrps.v10i2.415>

Production and Hosted by

IJRPS | <https://ijrps.com>

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INTRODUCTION

Edentulous is an indicator of oral health in a population (Anshary MF *et al.*, 2014). Loss of teeth is a state of losing one or more teeth from the

socket of alveolar bone (Ngangi RS *et al.*, 2012). Loss of teeth among women is the highest. According to the Health Research (Risksedas) in 2013, full edentulous in Indonesia has decreased from 2.1% in 2007 to 0.6% in 2013 (Agency health research and development department of health, 2013). When tooth loss occurs, the alveolar ridge height will decrease. This decrease causes instability, retention disruption and also decreases the ability of mastication (Ural C *et al.*, 2011). The decline occurred because the height of the alveolar ridge undergoes slow physiological resorption due to the absence of mechanical stimulus. The resorption level of alveolar ridge in mandibular is higher than the maxilla. This is because the maxillary bone is wider than mandibular thus the load received by the mandibular is greater (Reich

KM *et al.*, 2011). Maxillary alveolar ridge's height in dentate women and edentulous women can be measured by calculating the height of the alveolar ridge through panoramic radiography. Measurements were made by measuring the distance between the lowest point of the infraorbital ridge and alveolar crest maxilla on the incisor point, right and left premolar, right and left molar. The researcher is interested in studying more about the differences in the height of the maxillary alveolar ridge on dentate women and edentulous women using panoramic radiography, who came to the Dental Hospital, in the University of Sumatera Utara.

MATERIALS & METHODS

Sample criteria

This research is an analytical method using cross-sectional study performed in Radiology Dentistry Installation and Prosthodontics Installation the Dental Hospital, University of Sumatera Utara. This study was conducted from January-February 2017. The sample of this study were all women patients and students in the Prosthodontics Installation of the University of North Sumatra. This study uses 40 samples, 20 dentate and 20 edentulous. Samples must meet the following criteria. Inclusion criteria were: (1) the edentulous group, has a full edentulous jaw and menopause. (2) The dentate group has a dentate jaw entirely and haven't menopause. Exclusion criteria were: (1) have a diagnosed history of cysts, tumours on the jaw and suffering from systemic disease manifested on the bones. (2) Rejects request to become the sample. The tools used in this research is panoramic radiography *Instrumentarium* type OC 200 D 1-4-1, CliniView software version 10. 1. 2, mouth mirror, dental tweezers, prope, nierbekken, stationery and the sensors. The materials used are notepad, alcohol 70% and cotton.

Measurement steps

Measurement of the maxillary alveolar ridge on panoramic radiography is the distance between the lowest point of the infraorbital ridge (line O) and maxilla alveolar crest (lines A, B, C). Alveolar crest in edentulous patients was visible on the radiographic picture, whereas dentate patients are 1.2 mm from a cemento enamel junction. There are three points of measurements, which is incisor, premolar and molar. In edentulous patients, incisor point lies on the midline of the jaw guided by the nasal septum, and anterior nasal foramen and nasopalatine spine. Premolar point is guided at the infraorbital foramen. Molar point is guided at the inferior point of zygomaticus processes.

Measurements in edentulous women are shown in Fig. 1.

In dentate patients, incisor point lies in the midline of the jaw or the midpoint of the central incisor, premolar point located at the distal first premolar and molar points located in the distal first molar. Measurements in dentate women are shown in Fig. 2.

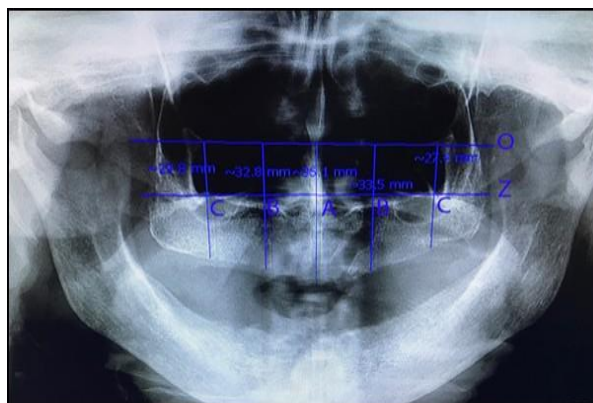


Figure 1: Measurement of maxillary alveolar ridge height on edentulous women



Figure 2: Measurement of maxillary alveolar ridge height on dentate women

The average height of the maxillary alveolar ridge was done using the Shapiro Wilk normality test. When the distribution results were obtained normal, data differences were tested using independent t-test. It is done using a computer program called SPSS 20.

RESULTS AND DISCUSSION

Measurement of the height of maxillary alveolar ridge on both the incisor teeth, right premolars and molars, left premolars and molars in dentate women is higher than in edentulous. These results are in accordance with the research in India (Panchbhai, 2013) and the research in Turkey (Canger *et al.*, 1995). In whole, the average value of *maxillary alveolar ridge* in dentate women is greater than edentulous women. The average height of the *maxillary alveolar ridge* in edentulous women is 33, 35 mm \pm 3, 8 and dentate woman is 35, 66 mm \pm 3, 21mm. Edentulous jaw does not get

Table 1: Result shows average value measurement on the height of the maxillary alveolar ridge in incisor, right premolar and molar point, left premolar and molar point

Teeth	Sample	N	Mean	Standard Deviation	Standard Error Mean
Incisor (Midline)	Edentulous	20	35.30	2.79	.62
	Dentate	20	37.57	3.34	.75
Right premolar	Edentulous	20	33.81	3.01	.67
	Dentate	20	35.87	3.10	.69
Right Molar	Edentulous	20	31.84	3.85	.86
	Dentate	20	33.87	2.81	.63
Left Premolar	Edentulous	20	33.93	2.88	.64
	Dentate	20	36.33	3.04	.68
Left Molar	Edentulous	20	31.90	3.47	.78
	Dentate	20	34.67	2.62	.59

Table 2: Results of measurements of the height of the maxillary alveolar ridge on edentulous and dentate women

Sample	N	Minimum	Maximum	Mean	Std. deviation
Edentulous	100	25.00	41.10	33.35	3:43
Dentate	100	28.00	42.40	35.66	3:21

Table 3: Shapiro Wilk test data

Teeth	Samples	Shapiro Wilk		
		Statistical	df	Sig.
Incisor (midline)	Edentulous	.99	20	.99
	Dentate	.92	20	.08
Right Premolar	Edentulous	.96	20	.60
	Dentate	.97	20	.66
Right Molar	Edentulous	.96	20	.51
	Dentate	.99	20	.99
Left Premolar	Edentulous	.97	20	.68
	Dentate	.96	20	.44
Left Molar	Edentulous	.96	20	.63
	Dentate	.96	20	.59

Table 4: The test data difference on the height of maxillary alveolar ridge values using independent t-test on incisor teeth

	F	Sig.	T	df	Sig. (2-tailed)	mean Difference	Std. error Difference	Lower	Upper
Equal variances assumed	.79	.38	-2.33	38	.03	-2.28	.97	-4.25	-.30
Equal variances not assumed			-2.33	36.86	.03	-2.28	.97	-4.25	-.30

Table 5: The test data difference on the height of maxillary alveolar ridge values using independent t-test on right premolar teeth

	F	Sig.	T	df	Sig. (2-tailed)	mean Difference	Std. error Difference	Lower	Upper
Equal variances assumed	.22	.64	-2.13	38	.04	-2.06	.97	-4.02	-.10
Equal variances not assumed			-2.13	38	.04	-2.06	.97	-4.02	-.10

enough mechanical stimulation, and the metabolism of the bone can be interrupted, causes the occurrence stimulation of osteoclasts and osteoblasts thus causing the resorption in the alveolar ridge which causes the decrease in the height of the *maxillary alveolar ridge* (Gofur *et al.*, 2015). Physiologically, for menopause women, there are hormonal and musculoskeletal changes. This lead to a decrease in estrogen levels and an increase in alveolar bone resorption. The length of a woman's menopause effects the decrease in bone density which also causes a decrease in the height of the *maxillary alveolar ridge* (Riadiani B *et al.*, 2014). Results for average value measurement on the height of the maxillary alveolar ridge in incisor, right premolar and molar point, left premolar and molar point are presented in Table 1.

An average height of the maxillary alveolar ridge in dentate women greater than edentulous. Research at Bagh College found that the average value of the maxillary alveolar ridge toothed group was greater than the edentulous group (Saed *et al.*, 2010). The average value is greater in women with teeth, namely 10.36 mm compared to women with edentulous 6.99 mm. Results for measurements of the height of the maxillary alveolar ridge on edentulous and dentate women are presented in Table. 2.

Prior to test the validity and the difference, a normality test is done by using the Shapiro Wilk test, acquired the entire value of Sig. > 0.05. This means the data satisfy the assumption of normality. Then the difference test is done by using 2 sample t-test with independent samples t-test. Results of normality by using the Shapiro Wilk test are given in Table. 3.

In the anterior maxilla, resorption of the alveolar ridge in the lateral incisors is the smallest (Zhang *et al.*, 2015). In women with edentulous, the smallest resorption occurs in the anterior teeth. This can be caused by several factors. First, the lowest altitude of the alveolar ridge is in the posterior region of the molar, then premolar and highest anteriorly according to the spee curve. Second, in the anterior region of the mandible there is an attachment to the genial muscle, so the force exerted by the area at the time of occlusion stimulates the adaptation of the maxillary alveolar ridge metabolism so that it has a greater height. The height of the maxillary alveolar ridge on incisor teeth and right premolar teeth between dentate and edentulous women, the value of sig. is > 0.05. The result of line equal variances assumed using the sig. (2-tailed) is < 0.05. There is a statistically significant difference on the height of the maxillary alveolar ridge on incisor teeth and right premolar teeth between dentate and

edentulous women. Results of the test data difference on the height of maxillary alveolar ridge values using independent t-test on incisor teeth and premolar teeth are given in Table 4 and 5.

The results of this study indicate that there are differences in the height of the maxillary alveolar ridge in women edentulous and toothed. Statistically, there are significant differences between toothed groups with edentulous at each measurement point except the right molar teeth. In right molar teeth, there were differences but not significant between women with teeth and women with edentulous. The height of maxillary alveolar ridge values using independent t-test on right molar teeth, the value of sig. is 0.25 (> 0.05). The result of line equal variances assumed using the sig. (2-tailed) is 0.07 (> 0.05). Alveolar ridge resorption occurs after tooth loss. The duration of tooth loss affects the extent of resorption of the alveolar ridge and cause a decrease in the height of the alveolar ridge (Abdulhadi *et al.*, 2009) The maxillary alveolar ridge height in some samples of the toothed female group was lower than in the female edentulous group. This is related to the spee curve where the normal height of the alveolar ridge at the molar point is lower than the other points. This is likely to cause the average height of maxillary alveolar ridge for edentulous and toothed women experiencing differences but not significant at the point right molar. Results of The test data difference on the height of maxillary alveolar ridge values using independent t-test on right molar teeth are presented in Table. 6.

Anatomical factors namely the quantity and quality of bone from alveolar ridge play an important role in the occurrence of alveolar ridge resorption (D'Souza D, 2012). The possibility of this is also due to the height of the maxillary alveolar ridge in each sample varying in the toothed female group and the female edentulous group. I have obtained maxillary alveolar ridge elevation in several samples of groups of women with lower teeth than the group of women edentulous. The height of the maxillary alveolar ridge on the left premolar teeth and left molar teeth between dentate and edentulous women, the value of sig. is > 0.05. The result of line equal variances assumed using the sig. (2-tailed) is < 0.05. There is a statistically significant difference on the height of the maxillary alveolar ridge on incisor teeth and right premolar teeth between dentate and edentulous women. Results of the test data difference on the height of maxillary alveolar ridge values using independent t-test on incisor teeth and premolar teeth are given in Table 7 and 8.

Panoramic Radiograph is used for support in the field of dentistry because it can give a picture of the

Table 6: The test data difference on the height of maxillary alveolar ridge values using independent t-test on right molar teeth

	F	Sig.	T	df	Sig. (2-tailed)	mean Difference	Std. error Difference	Lower	Upper
Equal variances assumed	1:39	.25	-1.9	38	.07	-2.03	1:07	-4.18	.13
Equal variances not assumed			-1.9	34.77	.07	-2.03	1:07	-4.19	.14

Table 7: The test data difference on the height of maxillary alveolar ridge values using independent t-test on left premolar teeth

	F	Sig.	T	df	Sig. (2-tailed)	mean Difference	Std. error Difference	Lower	Upper
Equal variances assumed	.05	.83	-2.56	38	.01	-2.40	.94	-4.30	-.50
Equal variances not assumed			-2.56	38	.01	-2.40	.94	-4.30	-.50

Table 8: The test data difference on the height of maxillary alveolar ridge values using independent t-test on left molar teeth

	F	Sig.	T	df	Sig. (2-tailed)	mean Difference	Std. error Difference	Lower	Upper
Equal variances assumed	1.80	.19	-2.85	38	.01	-2.77	.97	-4.74	-.80
Equal variances not assumed			-2.85	35.31	.01	-2.77	.97	-4.74	-.80

tooth and its supporting structures both in the maxilla or mandibular. A panoramic radiograph is also used as a diagnostic tool in planning treatment using implants. The design of the implant that can be used is *endosseous* implants with a diameter of 3, 75 mm and the length varies between 7 mm, 10 mm, 13 mm and 15 mm. Fixing of implants performed when the sides are quite wide, and the distance between the implant and the maxillary sinus is 2 mm. This is because the panoramic radiography technique has enlarged images of the originals. Distortion on panoramic radiography is unavoidable because of the object shadow in film, a projection-related structure that varies in some individuals. Fixing of the wrong implants in the upper jaw can cause damage to anatomical structures at maxillary sinus and nasal fossa. This can lead to infection, redness and swelling around the implant, as well as a symptom in maxillary sinus including the formation of a fistula and sinus complications such as rhinitis (Jonah B, 2009). Because of this, the use of radiography dentistry is used to estimate the height of the *maxillary*

alveolar ridge so that the care plan on an edentulous patient can give a good result.

CONCLUSION

There is a difference in the height of the *maxillary alveolar ridge* significantly in edentulous women and dentate women except the at right molar teeth. The average height of the *maxillary alveolar ridge* in edentulous women is 33, 35 mm \pm 3, 8 and dentate women is 35, 66 mm \pm 3, 21 mm.

Acknowledgements

The authors are grateful to the radiology clinic at the dental hospital of the University of Sumatera Utara for providing facility clinics for research work.

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