The differences in the width of male and women maxillary sinus seen from panoramic radiography in tribe Students Minang Faculty of Dental Medicine, Baiturrahmah University

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Abstract

Objective: The purpose of this study was to determine whether there is a difference in the width of the maxillary sinus between male and female students of the Minang ethnic group, Faculty of Dentistry, Baiturrahmah University, seen from panoramic radiographs.

Material and Methods: This study is an analytical study with a sample size of 50 respondents using purposive sampling method. The data analysis is displayed using the frequency distribution table and the significance level using the SPSS program with the independent t-test.

Results: The results showed that the mean value of the width of the right maxillary sinus in men was 35.06 mm (CI 1.7381 ± 6.4219), while in women it was 30.98 mm (CI 1.7378 ± 6.4232). The mean value of the left maxillary sinus width in men was 35.38 mm (CI 2.6736 ± 6.6464), while in women it was 30.72 mm (CI 2.6732 ± 6.6469).

Conclusion: The conclusion of this study is that there is a significant difference between the width of the maxillary sinuses of men and women in Minang ethnic students, Faculty of Dentistry Baiturrahmah University with a p value <0.05.

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Introduction

Indonesia is a country geographically prone to natural disasters, such as landslides, earthquakes, volcanic eruptions, tsunamis and floods.[1] Recent research in the West Sumatra region indicates that the Mentawai segment of the Megathrust is Sumatra likely to undergo a shift in the next few decades, as the energy accumulated is too large. This plate shift can trigger an earthquake that has the potential to cause severe damage to most cities in Sumatra and trigger a tsunami disaster. Therefore, the people in Padang City are 88% are Minang people who have a very high risk of becoming disaster victims.

There are three racial groups in the world, among others: Mongoloid, Negroid, and Caucasoid. Indonesia is included in the Mongoloid group. The Mongoloid race consists of the Detro Melayu and Proto Melayu sub-racial groups. These racial characteristics are related to anthropometry, namely in measuring the frame and body. The Minang tribe comes from the Mongoloid race, which has a characteristic type cranium: bone zygomaticus a prominent, width of the medium apertura nasalis and a slightly tapered lower edge, and a medium palate width.

Forensic identification is an effort made with the aim of helping investigators determine someone's identity. The identification process is carried out based on the Interpol criteria, namely primary identification and secondary identification. Primary identification consisted of fingerprint analysis, teeth analysis and DNA analysis. Secondary identification includes a description of the individual (tattoos, scars, gender, and jewelry), medical findings, clothing and other evidence found.[2] Identification in Indonesian law is regulated in Law No.36 of 2009 Article 118 paragraph 1 concerning health, which states that an unrecognized corpse must be subjected to identification efforts.[3]

Individual identification can be done through several parameters, namely determining the approximate age, race and gender.[4] However, not all forensic cases provide a complete skeleton due to postmortem damage. Generally the skull is more resistant to damage because it is made up of hard tissue.[5] One of these is the maxillary sinus which is wide and high can be used to determine sex when the skeleton is incomplete.[6]

The maxillary sinuses are air spaces, located on the maxillary bones in various sizes and shapes. The process of formation of the maxillary sinuses is completed at about 20 years of age. The maxillary sinus tends to stabilize after the second decade of

life. The lower part of the maxillary sinus lies adjacent to the alveolar bone, first molars, second molars and third molars and the roots of the canines.[7]

Gender identification based on maxillary sinus size can be done using CT-scan and panoramic radiography. CT-scans provide more accurate results, because they can provide a three- dimensional image. Panoramic radiographs are used to examine the maxillary sinuses to support the initial diagnosis. Panoramic radiographs are less expensive and have a smaller radiation dose than CT scans. Panoramic radiographs provide bilateral maxillary and mandibular views and maxillary sinus mesiodistally.[8] So that the maxillary sinus size is considered to be able to identify sex through panoramic radiographs with digital sensors.

Using lateral cephalometric radiographs, showed that the mean maxillary sinus width in men was 36.11 mm ± 4.53 mm, while the mean maxillary sinus width in women was 32.12 mm ± 3.95 mm. The mean maxillary sinus height in men was 27.46 mm ± 3.39 mm, while the mean height the maxillary sinus in women is 27.08 mm ± 3.95 mm. Research Vidya years 2013, using 3D CT-scan, all maxillary sinus sizes were well sized anterior posterior, the vertical dimension or width in males is greater than in females. The maximal anteroposterior size was 39.3 ± 4.2 mm (male 40.7 mm, female 37.4) mm) and the maximum width is 32.6 ± 6.5 mm.14 While Manja's study in 2015, the mean value of the maxillary sinus size of the left side was 25.86 ± 2.98 mm. The mean value of the right sided maxillary sinus size was 25.85 ± 2.90 mm. The mean value of the maxillary sinus size of the Batak students aged 20-30 years was 25.86 ± 2.93 mm. Data analysis using independent t-test obtained p> 0.05, this value indicates no significant difference.

For this reason, the authors write this paper in order to find out whether there is a difference in the width of the maxillary sinus between men and women in the Minang ethnic group of students of the Faculty of Dentistry Baiturrahmah University seen from panoramic radiographs.

Material and Methods

This type of research is quantitative with the research method used is analytical. The approach used is cross sectional. The population of this study were students of the Faculty of Dentistry, Baiturrahmah University aged 20-25 years, male and female, with two generations of ethnicity, totaling 172 people. The research sample used for this study were as follows :

Inclusion criteria; Willing to be a respondent (there is a statement letter), good panoramic photo results (maxillary sinus clearly visible, no superimposed, double exposure, elongation, foreshortening, horizontal overlapping, cone cutting), subjects did not have abnormalities tooth and skeletal development, subjects aged 20-25 years, minang tribe two generations and above.

Exclusion criteria; there was a fracture in the maxillary bone, there was a paranasal sinus abnormality.

Samples were obtained as many as 25 men and 25 women from 172 students of the Faculty of Dentistry at Baiturrahmah University who were two generations of Minang ethnic based on inclusion and exclusion criteria. Taking the subject using purposive sampling technique. Research was conducted in November 2018-January 2019 in the Radiology section of the Dental Hospital Baiturrahmah University, Padang, Sumatra West.

Procedure; Take panoramic photos and collect panoramic photos according to the inclusion criteria of samples from the Dental Hospital Baiturrahmah University, Padang, the results of panoramic photographs and each patient is given a different code, the radiographic results are observed and measured by the researcher by: Opening the software CliniView(software) version 10.1; Press search to open a panoramic photo to be observed; Press the image and create a copy to produce a panoramic view that is the same as the original; Press contrast brightness to clarify the presence of alveolar ridge; Press the drawing toolbar (line) to make a horizontal straight line at the most inferior border of the mandible (X line) and a straight line (Y line); Press measurement (length) and make a vertical straight line drawn perpendicular to the X line and the vertical distance is measured at three points, the vertical line or median line (p), the outer; Mesial maxillary sinus (Q), the outermost distal maxillary sinus (R), to get the height of the maxillary sinus left to right; Press measurement (length) to make a horizontal line drawn with an X line that has been made in the middle of the three lines (lines A, B, C); The measurement results will come out automatically. Take notes on the measurement results of the maxillary sinus. Analysis of data from the measurement of the maxillary sinus.

Analysis Using two different test mean independent (independent t-test) using Confidence Interval (CI) of 95% and obtained statistically significant with p <0.05.

Results

The results of the maxillary sinus wide differences between men and women seen from panoramic radiographs figure 1 of Minang ethnic students at the Faculty of Dentistry, Baiturrahmah University.
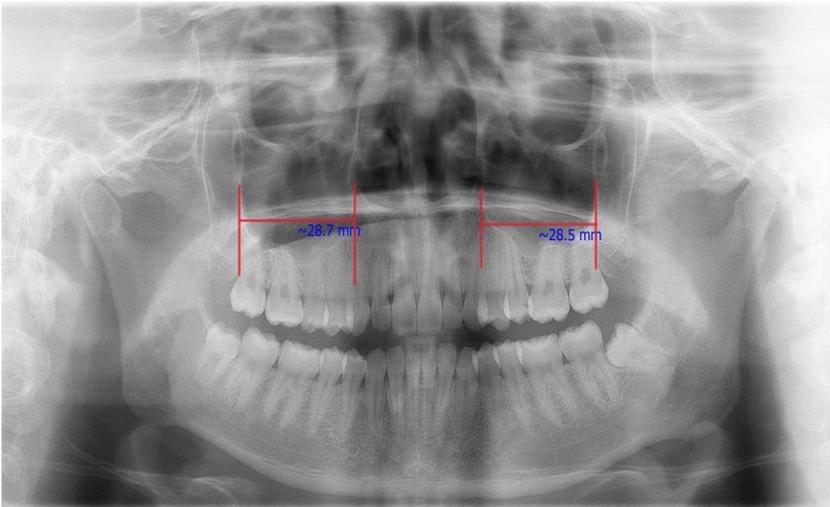
Figure 1   Maxillary sinus size analysis using panoramic radiography

Table 1   **Measurement results of the average value of the right maxillary sinus width for men and women seen from panoramic radiographs**

Gender	Mean Maxillary Sinus Width Right (mm)	P value (Independent t test)	CI 95%
Male	35.06	P = 0.000	1.7381 ± 6.4219
Women	30.98		1.7378 ± 6.4232

Table 2   **Results of the average value of measurement left maxillary sinus width for men and women seen from panoramic radiographs**

Gender	Mean Maxillary Sinus Width Left (mm)	P value (Independent t test)	CI 95%
Male	35.38	P = 0.001	2.6736 ± 6.6464
Women	30.72		2.6732 ± 6.649

Table 3   **The measurement results of the average value of the right maxillary sinus width and left seen from radiography of panoramic**

Gender	Mean Maxillary Sinus Width (mm)	P value (Independent t test)	CI 95%
Male	33.02	P = 0.976	-1.76397 ±1.71197
Women	33.05		2.6732 ± 6.649

Measurement of the average value of the width of the maxillary sinus in men and women:

Table 1 the average value of the width of the maxillary sinuses of the right and left men was greater than that of women. Based on statistical analysis using the independent t-test, there was a significant difference between the maxillary sinus widths of men and women with a value of p = 0.001 (right) and p = 0.000 (left) table 2.

Table 3 statistical analysis using the independent t-test, there was no significant difference between the width of the maxillary sinus left and right with a value of p = 0.976.

Discussion

A study was conducted on 50 Minang ethnic student respondents at the Faculty of Dentistry, Baiturrahmah University by measuring the width of the maxillary sinuses using panoramic radiographs with the aim of knowing the differences in the size of the maxillary sinuses between men and women. The mean value of the right maxillary sinus width in men was 35.06 mm (CI 1.7381 ± 6.4219), while in women it was 30.98 mm (CI 1.7378 ± 6.4232). And the mean value of the left maxillary sinus width in men was 35.38 mm (CI 2.6736 ± 6.6464), while in women was 30.72 mm (CI 2.6732 ± 6.6469).

There is a significant difference between the width of the maxillary sinus right and left in men and women, using the independent t-test shows a value of p <0.05. The average value of the right maxillary sinus in the Minang term was 33.02 mm (CI - 1.76397 ± 1.71197), and the left was 33.05 mm (CI -1.76413 ± 1.71213), on the test independent t-test showed no significant difference between right and left maxillary sinuses with a p value> 0.05. Research. Using lateral cephalometric radiographs in the Batak tribe showed that the average maxillary sinus width in men was greater than in women. Vidya et al.[11] using 3D CT-scan, all maxillary sinus sizes, both anteroposterior, vertical or wide dimensions in males were larger than females. Meanwhile, in the 2015 Manja study, there was no significant difference in the mean size of the maxillary sinus left and right of Batak students aged 20- 30 years.

The width of the maxillary sinus in males is greater than in females due to: male skulls are heavier, larger and coarser, whereas female skulls are lighter, smaller and smoother, and when viewed from the supraorbital, zygomatic, and bone bones Male occipital men are more prominent than women.[11] The size of the maxillary sinus is also influenced by race, different races usually carry different morphological features, so there is a large number of biological variations in humans. These racial characteristics are also related to anthropometry, namely in measuring both the frame and body. In this study using samples from the Mongoloid race, which are characterized by the type of cranium which tends to have bone zygomaticus a prominent,width of the medium apertura nasalis and a slightly tapered lower edge, and medium width of the palate.[2] This study uses panoramic radiography, panoramic radiography as a relatively inexpensive two-dimensional radiography, which has been proven to be used for gender identifica-

tion based on the width of the maxillary sinus. Gender identification is an important first step in the forensic identification process, because it can find a 50% probability of a match in the identification of an individual. Gender identification can be performed easily and with high accuracy using adult skulls. The difficulty of carrying out the identification and sex determination process makes it important to use denser bones that are often found intact, for example the maxillary sinus.[12,15]

If the skull is fully encountered in criminal cases and natural disasters, the sex can be determined with 100% accuracy.[13] In the case of a natural disaster and a criminal case, where another bone is destroyed in the skull but the maxillary sinus cavity is good, the width of the maxillary sinus can be used to analyze the sex quickly.[14]

Another relevant finding of this study is that it is possible to determine sex even if the skull is fragmented as long as there is one maxillary sinus, According to our findings, panoramic radiographs can be very useful. However, there are some limitations to use them in the forensic area, such as lack of equipment in most forensic laboratories, and the difficulty to put the remains in a static or sitting position, due to rigor mortis. It is also noteworthy, as is often the case, that radiographs are not filed, processed or fixed, which limits their application.[16-18]

Conclusion

conclusion of this study is that there is a difference in the width of the maxillary sinuses between men and women seen from panoramic radiographs in Minang ethnic students at the Faculty of Dentistry, Baiturrahmah University aged 20-25 years, with a larger male maxillary sinus width. than women.

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Conflict of Interest

The authors report no conflict of interest.

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