

DETERMINATION OF SEX USING SIGMOID NOTCH ON THE LEFT SIDE

Revathy.E

Saveetha Dental College and Hospital, Saveetha Institute of Medical and Technical Sciences,
Saveetha University, Chennai-600077.

Corresponding Author Dr. Abirami Arthanari

Senior Lecturer, Department of Forensic Odontology, Saveetha Dental College and Hospital,
Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai-600077

ABSTRACT

BACKGROUND

The mandibular notch, also known as the sigmoid notch, is a groove in the ramus of the mandible. It is the space bounded anteriorly by the coronoid process and posteriorly by the condylar process. The shape of the sigmoid notch depends on the morphological variations of the coronoid and condylar processes.

AIM

The aim of the present study is to determine the sex using sigmoid notch on the left side.

MATERIALS AND METHOD

This study examined 60 digital panoramic radiographs. The length of the mandibular notch was measured from the anterior surface of the head of the mandible to the posterior surface of the coronoid process. Descriptive statistics and the Pearson Chi square test was used to analyse the relationship between sex and length of the mandibular notch using SPSS software version 26.0

RESULT

The value of mean for the length of sigmoid notch for male was found to be 35.5667 and the value for females was 34.5667. The significance (p value) was found to be 0.433

CONCLUSION

From the results of the present study, it can be concluded that the length of sigmoid notch was greater in males than in females, but the values were not statistically significant.

KEYWORDS: Mandible, Radiograph, Sigmoid notch

INTRODUCTION

Sex determination of bones plays an important role in the study of anthropology and forensic science. (1) It is the first step in the identification of individuals at mass disasters where the bodies are damaged beyond recognition. (2) The accuracy of sex determination is 100% with a complete skeleton, 95% with pelvis and 90% with skull. (3) According to Sassouni V (1963), identification

of humans is classified into a reconstructive method, where there are no identities of bodies, and a comparative method in which the radiological ante- and post-mortem records are compared. (4) Although the skull has remained useful for establishing biological profiles in mass disasters, in most situations the entire skull is not available. In such cases, mandible plays a vital role in determining the sex of the subjects. (5)

Mandible plays a key role in sex determination as it is the largest bone of skull and shows most dimorphic variations. (6) The mandibular notch, also known as the sigmoid notch, is a groove in the ramus of the mandible. It is the space bounded anteriorly by the coronoid process and posteriorly by the condylar process. It allows the passage of the masseteric nerve and masseteric vessels. (7) The shape of the sigmoid notch depends on the morphological variations of the coronoid and condylar processes. These morphological variations may either be genetically influenced or caused due to the functional changes during growth.(8)

Forensic odontology relies greatly on radiography which is mainly used to identify individuals, determine the age, sex and ethnic group of the victim. (9,10) The maxillofacial radiographs enable a medical professional to archive the antemortem records and compare it with the postmortem records when needed. (11,12)(13,14)(15) The aim of the present study is to identify the sex of the individuals by analysing the sigmoid notch of mandible using radiographs.

MATERIALS AND METHOD

Sample collection

The present study was conducted at the department of Forensic Odontology, Saveetha Dental College, Chennai. This study examined 60 digital panoramic radiographs obtained from the department of Oral medicine and radiology, Saveetha Dental College and Hospital, Chennai . Panoramic radiographs of patients who presented with history of trauma, presence of developmental defects of the mandible or any other pathological changes affecting the mandible were excluded from this study.

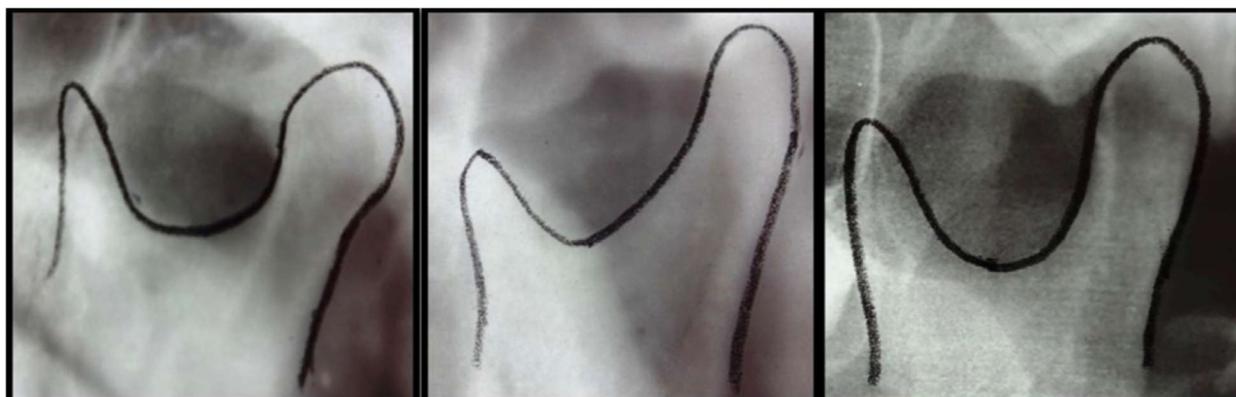
Morphometric parameter and methodology

The length of the mandibular notch was measured from the anterior surface of the head of the mandible to the posterior surface of the coronoid process. The panoramic radiographs were examined by the planmeca software and the data were entered on Microsoft Excel sheet.

Statistical analysis

The collected data was captured and analyzed using SPSS version 26.0. Descriptive statistics and the pearson Chi square test was used to analyse the relationship between sex and length of the mandibular notch. A 95% confidence level was adhered to for all statistical tests. A p- value of

less than 0.05 was considered to be statistically significant.



RESULTS

The results of the descriptive statistics were analyzed and the values of mean and standard deviation for the length of the sigmoid notch were compared between both the sexes. The values of mean and standard deviation were found to be greater for male (35.5667) than females (34.5667). (Table 1) (Figure 1&2) The pearson Chi square test was performed to find the significance between the length of sigmoid notch and the sex of individuals. The p value was found to be $0.433 > 0.05$. (Table 2) Although the mean and standard deviation was greater for male than females, the value was statistically insignificant in the present study.

| Descriptive Statistics | | | | | |
|-----------------------------|----|---------|---------|---------|----------------|
| | N | Minimum | Maximum | Mean | Std. Deviation |
| actual age male | 30 | 22.00 | 50.00 | 35.5667 | 7.69542 |
| actual age female | 30 | 20.00 | 50.00 | 34.5667 | 8.48399 |
| sigmoid notch values male | 30 | 16.70 | 43.10 | 29.7833 | 5.90623 |
| sigmoid notch values female | 30 | 21.10 | 35.70 | 25.9767 | 3.60543 |
| Valid N (listwise) | 30 | | | | |

Table 1

Table 1 represents the descriptive statistics of the length of sigmoid notch in male and female with the values of maximum, minimum, mean and standard deviation.

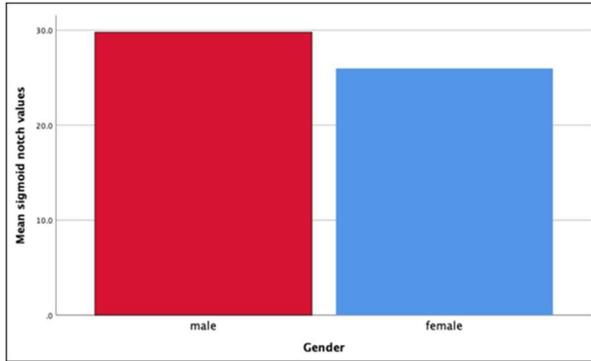


Figure 1

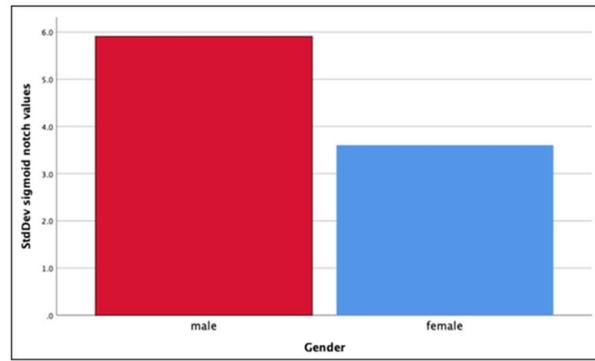


Figure 2

Figure 1 represents the graph between gender and mean value of the length of sigmoid notch. X axis- Gender; Y axis- Mean length of sigmoid notch. Red color denotes Male and blue color denotes female .

Figure 2 represents the graph between gender and standard deviation of the length of sigmoid notch. X axis- Gender; Y axis- standard deviation of the length of sigmoid notch. Red color denotes Male and blue color denotes female .

| Chi-Square Tests | | | |
|------------------------------|---------------------|----|-----------------------------------|
| | Value | df | Asymptotic Significance (2-sided) |
| Pearson Chi-Square | 50.000 ^a | 49 | .433 |
| Likelihood Ratio | 69.315 | 49 | .030 |
| Linear-by-Linear Association | 7.985 | 1 | .005 |
| N of Valid Cases | 60 | | |

Table 2

Table 2 represents the pearson chi square test. P value- 0.433 which is statistically insignificant. (p> 0.05)

DISCUSSION

From the results of the present study, it is found that the values of the mean and standard deviation for the length of the sigmoid notch measured from the anterior surface of the head of the mandible to the posterior surface of the coronoid process was greater for males than for females. But the values were not statistically significant. The results of (16) , it was found that the variations in the

morphology of sigmoid notch plays a key role in human identification.

In another study, conducted by (17) , the length of the mandibular notch was found to be greater in males than females and the length showed a statistically significant relationship with age (p-value=0.000). The study also concluded that knowledge of the anatomy of the sigmoid notch assists in reconstructive surgical procedures, and may also aid the forensic anthropologists in the identification of unknown remains in mass disasters. (18)

The results of the present study correlated to the study conducted by (19), where the mean value for the length of sigmoid notch was greater in male than in female and the values were not statistically significant. In another study conducted by Shazia et al., The sigmoid notch showed variations in its length and shape among the Kashmiri population. Understanding these variations helps in detection of gender and plays a key role in the diagnosis of pathologies in those regions.

Understanding the morphological variations of the mandible plays a key role in sex determination as the mandible is known to show dimorphic variations. The major limitation of the present study is the small sample size because it does not represent the entire population. In future, the same study can be conducted with a larger sample size among different groups and different mandibular parameters can be assessed for its variations among male and female gender.

CONCLUSION

From the results of the present study, it can be concluded that the length of sigmoid notch was greater in males than in females, but the values were not statistically significant. However future study with larger sample size is necessary for further understanding.

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CONFLICT OF INTEREST

The authors hereby declare that there is no conflict of interest in this study.

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