

Research Article

SEX DETERMINATION WITH MANDIBULAR RAMUS – A RETROSPECTIVE STUDY BASED ON CONE BEAM COMPUTER TOMOGRAPHY

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ABSTRACT

The medicolegal investigations are mainly based on the skeletal remains. Sex determination is mainly investigated using pelvis bone and skull. Mandible expresses univariate sexual dimorphism and hence play a role in sexual analysis. Mandible, being a dense compact bone is sturdy and can be well preserved comparing to other bones. Metric analysis on the radiographs is objective, accurate and easily reproducible and hence is the most used tool for skeleton sex determination.

Aim and Objectives

- To determine the effectiveness of mandibular ramus in sexual analysis
- To measure, compare and evaluate the various observations of the Cone Beam Computed Tomography.

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INTRODUCTION

In forensic studies, most of the methods for age and stature estimation are sex dependent and hence sex analysis plays a major role. Skull being dimorphic is up to 92% accurate in sex determination (Saini *et al.*, 2011). The mandible is the largest and strongest bone of the skull and is hence used for sex analysis more commonly (Saini *et al.*, 2011; Scheuer, 2002; Durić *et al.*, 2005; Hu *et al.*, 2006). Male bones are generally bigger and sturdy than the female bones (Scheuer, 2002). The size, strength and angulation of muscles of mastication, influences the expression of mandibular dimorphism as the extent of use of these muscles vary in males and females (Franklin *et al.*, 2008).

INCLUSION CRITERIA

- 100 CBCT projections of the mandible.
- Dentulous images of the mandible

EXCLUSION CRITERIA

- History of mandibular deformity caused by trauma, developmental disturbances or other pathologies.
- Completely edentulous ridges

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MATERIALS AND METHODS

A retrospective study was conducted by using 100 CBCT taken using promax 3D Mid ProFace. 50 males and 50 females scans are used. The mandibular ramus is measured using Romexis software. The measurements are analysed using discriminant functional analysis. The mouse driven method where the mouse is used to draw lines connecting the chosen points on the digital radiograph is used and the following parameters and determined:

- Maximum breadth of the ramus
- Minimum breadth of the ramus
- Height of the condyle or the maximum height of the ramus.
- Projective height of ramus
- Height of the coronoid

RESULTS

CBCT images of 50 males and 50 females were analysed. Table.1 illustrates that there was very less difference in the mean of the maximum and minimum breadth of the ramus between the two groups. The Table.2 illustrates that the standard deviation was also minimal between the two groups. A male predominance was observed in the height of the coronoid, height of the condyle and the projective height of the ramus.

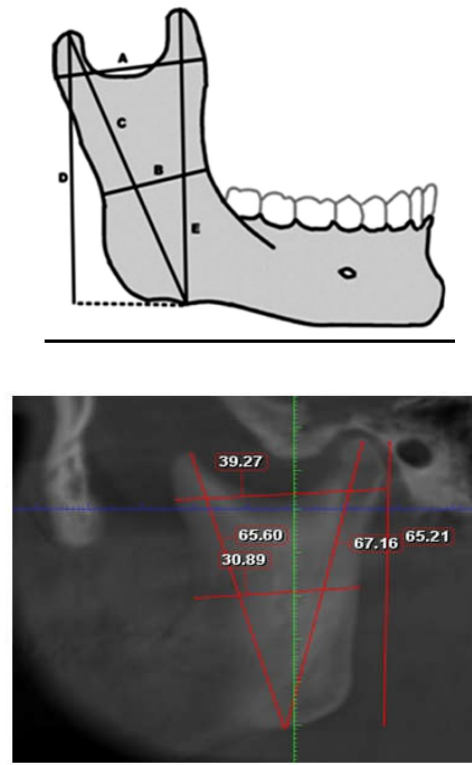


Figure 1.



Table.1

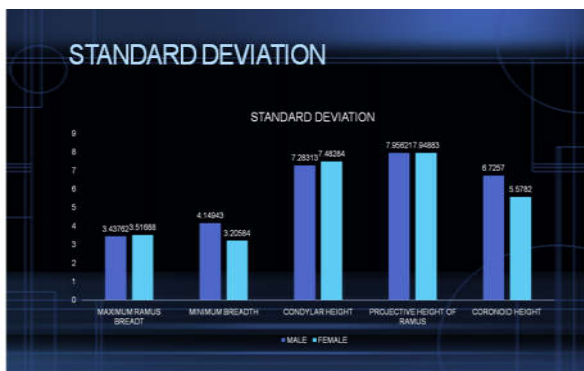


Table 2.

DISCUSSION

The sex determination plays a concrete role in forensic medicine. Forensic study on teeth and related jaw bones is more prevalent when it comes to sex determination (Vodanovic et al., 2006).

Morphological aspects of the bone is used for sex identification but it likely to be inaccurate due to its subjectivity (Humphrey et al., 1999; Franklin et al., 2007; Franklin et al., 2008). Modern diagnostic techniques gives us the privilege to acquire more accurate results by using methods based on dimensions and morphometry. Mandible being more study is recovered intact in most cases of forensics and hence is used most commonly for this analysis (Franklin et al., 2008).

In this study, discriminant functional analysis was used to measure the five variables on the mandibular ramus and the result illustrated a sexual difference in them. It is evident that ramus expresses a sexual dimorphism. In the studies carried out by Humphreys et al, the mandible did not express the univariate sexual dimorphism and had mild variations in aspects like condylar height, minimum breath of the ramus and the projective height of the ramus A further more a study has to be done for better results as our study was performed using a small sample.

Conclusion

This study on the ramus of the mandible demonstrates that the ramus can be used in determination of sex even when complete mandible was not able to be retrieved for forensic studies. A larger and more diverse study may augment the efficacy of these parameters in sex determination.

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