

Original Research Article

Evaluation of sexual dimorphism of inter condylo-coronoid process distance by panoramic radiography in south Indian population

Running Title: Sexual dimorphism and inter condylo-coronoid distance using panoramic radiography

Abstract:

Background: Sexual dimorphism is a condition where the sexes of an equivalent species exhibit different characteristics beyond the differences in their sexual organs. Sexual identification is most significant in huge fatality accidents where the body is beyond recognition. **Coronoid process of** mandible is a triangular eminence, thin and flattened in size and shape. The Condylar process is the process of the mandible and it is thicker than the coronoid process. **Identification of Gender characteristics is of forensic importance.**

Aim: **To evaluate the sexual dimorphism of inter condylo-coronoid process distance by Panoramic radiographic study in the south Indian population.**

Materials and methods: A total of 49 digital orthopantomogram collected from a private dental college **in Chennai**. The distance between the condylar and the coronoid process is measured on both sides of a digital orthopantomogram using adobe photoshop. The data was analyzed and observed using SPSS v23.0 and the standard deviation was calculated.

Results: The mean of left and right distance of inter condylo-coronoid distance is 2.45cm and 2.52cm respectively. The standard deviation of left and right distance of inter condylo-coronoid distance is 0.32cm and 0.31cm respectively.

Conclusion: From the results obtained, within the limitations of the study it can be concluded that there is no significant difference in the measure of distance between inter

condyle-coronoid processes in terms of age and gender. Future studies should be conducted with large samples to get conclusive results using advance CBCT.

Keywords: Sexual dimorphism; orthopantomogram; coronoid process; condylar process; innovative technique;

Introduction:

One of the oldest approaches in forensic anthropology and medico-legal investigations is determining sex through morphological assessment. The strategy may change depending on the accessible bones and their state. In circumstances of mass fatalities, where bodies are destroyed beyond recognition, sex identification is crucial. When an adult's whole skeleton is available for study, sex may often be identified with near-perfect accuracy (Pelvis) (1). However, in catastrophic disasters, where shattered bones are common, determining sex with 100 percent accuracy is impossible, and sex determination is based mostly on the accessible skeleton components. After the pelvis, the skull is the most dimorphic and simply sexed part of the skeleton (2). However, because the mandible is the most dimorphic bone in the skull, it may play an essential role in determining sex in circumstances where a full skull is not discovered. When forensic data is unavailable, anthropometry of the intraoral regions and face can be useful in the field of forensic odontology (3). Because no two mouths are alike, 'sexual dimorphism' refers to the distinctions in size, stature, and look between male and female that will be used in dental identification.(4).

The term coronoid process is used to describe two distinct structures present within the physical body. The primary structure is found in the jawbone, which is referred to as the mandible. The ulna, an elongated bone found within the forearm, has the opposite coronoid process. The mandible's coronoid process appears to be triangular in shape (5). The coronoid process (from Greek korone, "crown") of the mandible is a thin, triangular prominence that is flattened from side to side and varies in size and shape. The method is

oriented above and forwards somewhat. It's a top border with a convex form on top and a concave shape on the bottom.(6)

The condyle has an articular surface for articulation with the temporomandibular joint's articular disc; it's convex from front to back and side to side, and the posterior surface is longer than the anterior surface. Its long axis is medially and somewhat backward, and if extended to the centre line, it will meet the opposite condyle near the foramen's anterior boundary. There may be a tiny tubercle at the lateral end of the condyle for the temporomandibular ligament to attach to. The condyle's articular surface is covered in animal tissue and contacts with an avascular, non-innervated articular disc (or meniscus) (collagen, fibroblasts).The experience from our previous studies (7) (8,9) (8)(10)(11)(12)(13)(11,13)(14)(15) (16) have led us to focus on the current topic.

Anatomy, Forensic Odontology, Anthropology, and Palaeontology all use sex estimation to determine the age and identification of remains. (17,18). The mandible is the strong bone and large and retains the shape than other bones within the physical anthropological field and forensic. The mandible is often won't distinguish among ethnic groups and between sexes. **Our team has research** experience that has translate into high quality publications (19–26),(27),(28),(29),(30,31),(32),(33),(34–38) Thus the present study attempted to evaluate the sexual dimorphism of inter condylo-coronoid process distance by digital orthopantomogram in the south indian population.

Materials and methods:

This is an anthropometric study conducted in a private dental college and hospital and examines 49 digital orthopantomogram of the South Indian population in Chennai. This study includes 26 males and 23 females' samples The study is approved by the institutional review board. It is a retrospective study. The distance between the coronoid process and the condylar process were measured in the digital orthopantomogram for both sides using the scale option in Adobe Photoshop and all the values were tabulated. Analysis was done using SPSS version 23. Mean and standard deviation was done for the values. Independent -t- test was done for gender comparison analysis. **Panoramic radiographic images with intact teeth were included for the study. Radiographic images with missing or fractured teeth were excluded.**

Results :

In our study we found the mean of left and right distance of condylo-coronoid distance is 2.45cm and 2.52cm respectively. The current study was carried out on 49 digital radiography to determine the sex. Further analysis done by categorizing it into male and female. This study includes 26 males and 23 females' samples. The mean of left inter condyle-coronoid distance in male and females are 2.5cm and 2.3cm respectively with significance level of P Value < 0.08, (Fig 1).The mean of right distance in male and females are 2.5cm and 2.4cm respectively with significance level of P Value<0.11 (Fig 2).

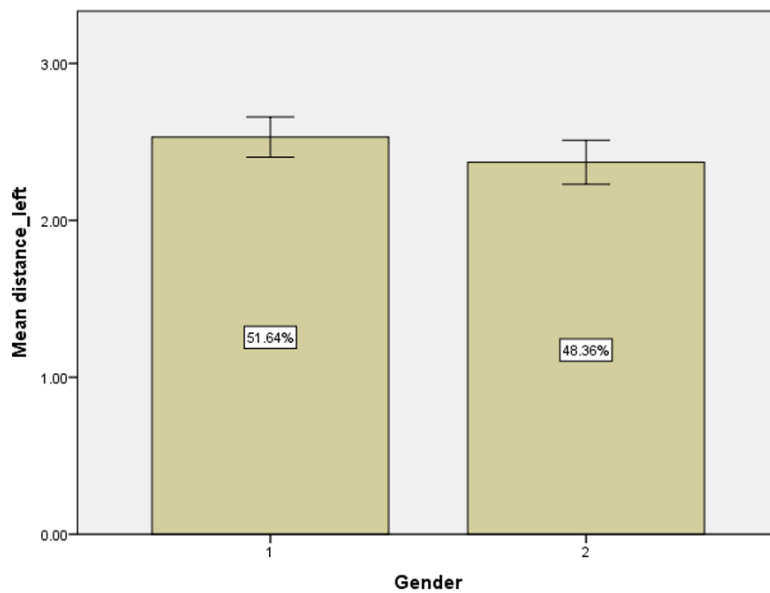


Figure 1: This graph represents the comparison analysis of mean left distance of condylo-coronoid process between Gender. In the X axis, 1 represents male and 2 represents female, Y axis represents the mean distance in centimeters. By this graph, the mean of left inter condylo-coronoid distance is higher in male compared to females, with p value<0.08, which is not statistically significant.

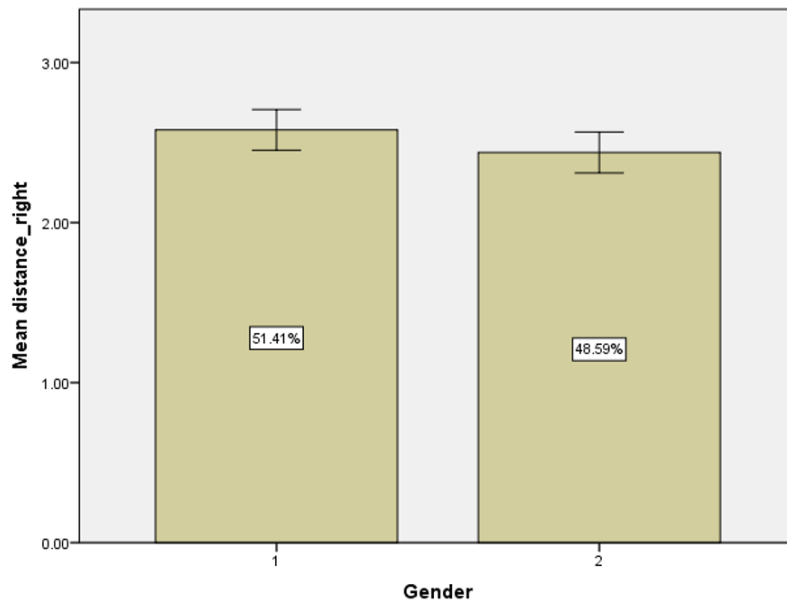


Figure 2: This graph represents the comparison analysis of mean right distance of condylo-coronoid process between Gender. In the X axis, 1 represents male and 2 represents female. Y axis, represents the mean distance in centimeters. By this graph, the mean of right inter-condylo-coronoid distance is higher in male compared to females, with p value < 0.11, which is not statistically significant.

Discussion:

In our study we found the mean of left and right distance of condylo-coronoid distance is 2.45cm and 2.52cm respectively. In a study on Thailand population by (39), the mean values for the bicondylar diameter were 12.38 cm and 11.61 cm respectively and this was found to be significant and they concluded that it can be used in forensic for determining the gender of the population.

Tohno et al in his study reported that the mandible of the condyle region is one of the sexual dimorphic regions and it can be used in forensic cases. (40) and this is similar to our finding. In a study, conducted on sex determination by using mandible by morphometric and morphological analysis. He found that mandibles exhibit sexual dimorphism and concluded that morphometric and morphological parameters were important to find the gender of the mandible.(41) A study by sultana et al., observed 7 morphometric and 5 morphological and measured and evaluated. They found that males have higher mean values compared to females and the parameter was found to be highly significant. They concluded that adult mandible is highly significant and highly accurate in determination of sex (42).

A study Sambhana et al. by on determination of sex using digital OPG. Their study was conducted on 384 individuals and concluded that all variables of the mandible were reliable for sex determination in forensic use. (43) A study by Okkesim and sezen on determination of sex using mandibular ramus. Their study was conducted on 70 individuals and five parameters were measured and concluded that sex determination using measurement of mandibular ramus is an useful tool. The limitation of our study was the inability to find the gender of the mandible using digital radiography and larger samples were not conclusive due to limited sample size. Future research has to be conducted on a large scale in this context as it may have forensic significance in gender determination,

Conclusion:

From the results obtained within the limitations of the study it can be concluded that there is no significant difference in the measure of distance between inter condyle-coronoid processes in terms of age and gender. Future studies should be conducted with large samples to get conclusive results using advance CBCT.

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