

GONIAL ANGLE IN SEX DETERMINATION USING ORTHOPANTOMOGRAM (OPG) AN SHORT STUDY

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Abstract:

Background: Forensic Anthropology has a crucial role in sex determination from human remains. Human skeleton such as cranium, pelvis and mandible. Several Anthropometric tools are there in determination of sex i.e. Shape of mandible, mental Foramen, gonial angle. Gonial angle has an excellent tool for sex determination. Gonial angle values may be changed due to bone density and masticatory forces. Aim of the study is to examine sex determination method using gonial angle.

Materials and methods: A total of 50 radiographs (25 males and 25 females) were taken as per the study. This study was divided into two sections: male and female, between the age group 51 to 60 years. The gonial angle, which is formed by 2 lines: (1) between the most posterior point of the mandibular condyle and the gonion and (2) between the most inferior point of the mandibular symphysis- sis and gonion, was measured on computed tomography scans.

Statistical analysis: The data were analysed by using SPSS software. The probability value $p < 0.05$ is considered as significant and the value $p > 0.05$ was considered as not significant.

Results: Tables and graphs show the sample size, mean and standard deviation of both males and females. In present research, a statistically significant correlation between dental maturity was confirmed. Results show Females were frequently observed to experience each stage of dental maturation earlier.

Conclusion: The study concludes that the determination of sex using gonial angle measurement. This study demonstrates that categorising the sample into age groups makes the data more valuable for examining the differences related sex determination.

Keywords: sex determination, gonial angle and orthopantomogram.

Introduction:

Many different attributes of the skull are proposed as a way of “traditional” sex estimation. On the skull, several features like the mandibular or gonial angle display sexual di- morphism. The opinion of coitus in bone remnants is necessary in forensic practice and forensic anthropology. (1)Coitus identification is of significance in cases of mass casualty incidents where bodies are

damaged beyond recognition and it depends largely on the available corridor of shell. Generally, in presence of cadaverous rudiments in good condition, morphological pointers of sexual dimorphism allow a correct opinion in further than 95% of cases. Skull is the most dimorphic and fluently sexed portion of the shell after the pelvis. But in cases where complete cranium isn't planted, beak may play a vital part in coitus estimation, as it's the most dimorphic, largest and strongest bone of the cranium that's frequently recovered and largely complete. Skeleton has always aided in genetic, anthropological, odontological, and forensic investigation of living and non-living individuals. Skull bones and pelvis are majorly utilized in sex determination. Sex is one among the essential factors of forensic odontology in establishing the identity of the person. Estimation aged at the time of death is a crucial step in identification of human remains. If the age is accurately estimated, it'll significantly narrow the sector of possible identities which will need to be compared to the remains during mass disasters, natural calamities to determine an identification, thus enabling a more efficient and time-saving approach. A number of styles for age determination have been proposed.(2)These can be classified into four orders,clinical, radiological, histological, and chemical analysis. In living persons whose factual age isn't known or is to be verified any or all the below styles can be used to determine the age. Still in the dead, posthumous changes similar as corruption, mutilation or skeletonization may make identification precipitously more delicate nearly to the point of impossibility.

The gonial angle in cephalometric x-rays is an important parameter for determining the growth pattern of an individual, assessing the rotation of the mandible and the extraction pattern in class II patients, making decisions regarding whether to perform surgery in class III skeletal base patients, and estimating age in forensic medicine.(3)Panoramic radiography, which is considered the gold standard of care for dental screening, diagnosis and treatment planning, is used by dentists from other specialties and orthodontists alike. It provides a significant amount of information about the dentition and the supporting bone, and also is used for screening of pathological and developmental problems such as cysts, tumours, cancer, supernumerary teeth, the congenital absence or premature loss of teeth, fused teeth to the bone, abnormally retained teeth, tooth eruption path especially of third molars, bone pathology, and mandibular asymmetry. (3,4)Bulut Panoramic radiography is useful for measuring the gonial angle with more accurate performance than lateral cephalography, as the superimposed gonial angles in cephalography can affect their tracing. A panoramic radiograph provides adequate information about both left and right sides; hence, it would be reasonable to assess them equally(5). Determination of gender is an important part of forensic science and anthropology and in medico-legal issues. Among various other measures, gonial angle can be used to differentiate between male and female strongly to express univariate sexual dimorphism. When skeletal sex determination is considered, angular and metric analyses on the radiographs are often found to be of greater importance because of their, reliability, reproducibility, accuracy and objectivity. Aim of the study is to determine the sex using gonial angle.

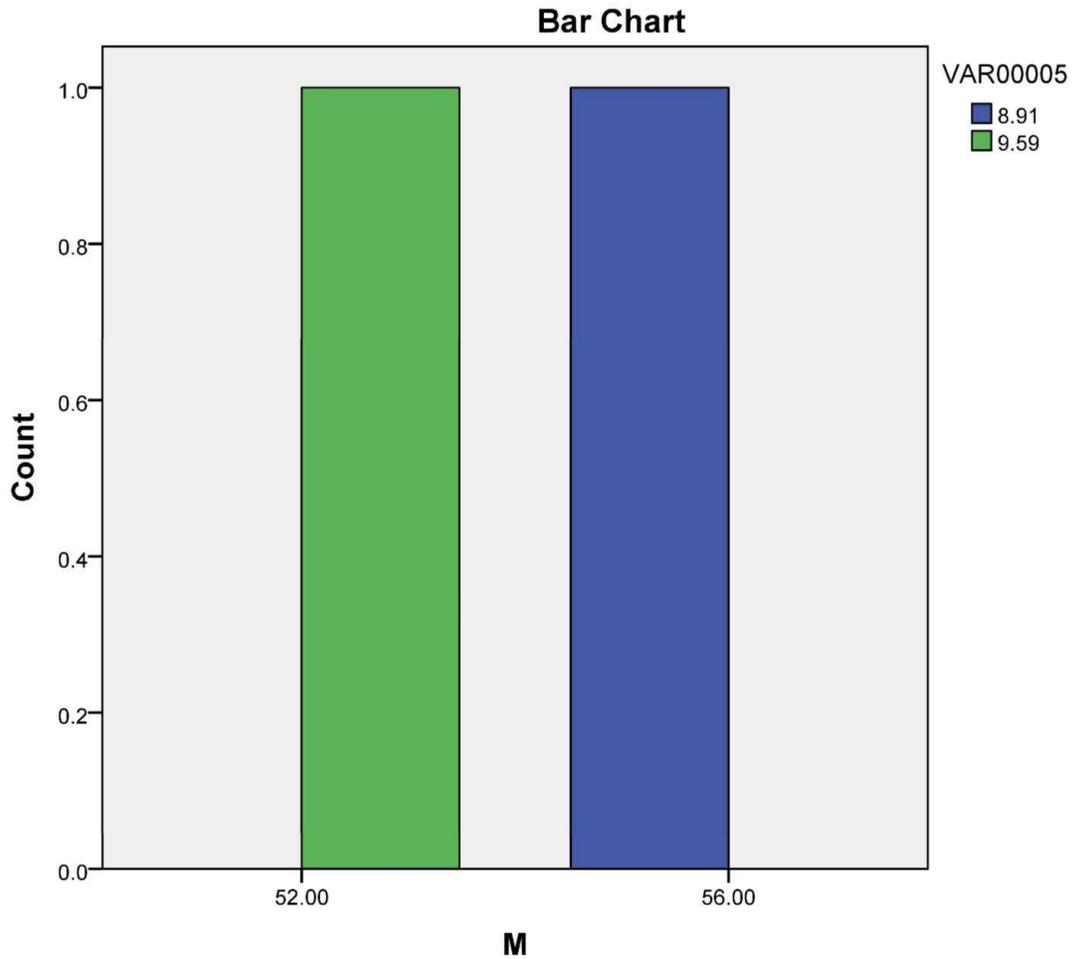
Materials and methods:

This is a retrospective study that was carried out at a private dental college. A total of 50 radiographs (25 males and 25 females) were taken as per the study. This study was divided into two sections: male and female. Patients between the ages of 51 to 60 years were included, as were high-quality OPGs in terms of coloration and angulation. Patients affected with dental and maxillofacial fractures, joint disjunction, traumas, pathological lesions around temporomandibular joints were excluded and Patients undergoing surgery or orthodontic purposes were excluded from the study. Data were analysed statistically by SPSS 2.3.

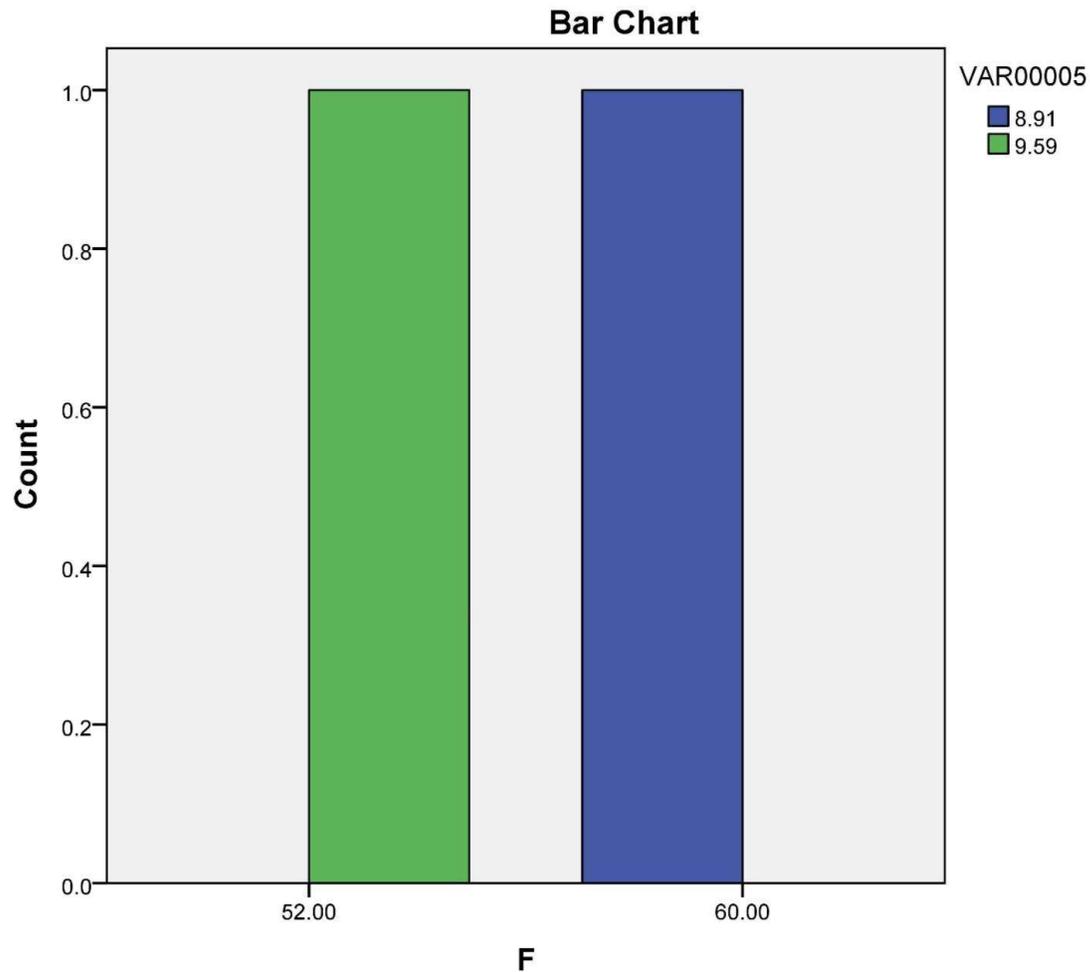
Results:

	Sample size	Mean	Standard deviation
Male	25	120.39	9.6
Female	25	125.06	8.9

Table:1 The above table and graph shows the sample size, mean and standard deviation of both males and females. This study illustrates the mean and standard deviation of 120.39 ± 9.6 in males and 125.06 ± 8.9 in females. In present research, a statistically significant correlation between Gonial angle of males and females was confirmed.



Graph:1 This graph shows the mean value of the Gonial angle measurement in males and females. The X axis represents Male. The Y axis represents the number of samples involved. The mean value of the Gonial angle is observed to be statistically significant with $p < 0.05$.



Graph:2 This graph shows the mean value of the Gonial angle measurement in males and females. The X axis represents Female. The Y axis represents the number of samples involved. The mean value of the Gonial angle is observed to be statistically significant with $p < 0.05$.

Discussion: Due to skeletal disintegration from explosions, combat, and other mass tragedies, determining the gender of an unidentified skeleton can be quite difficult(6). In forensic anthropology and medicine, identification of skeletal remains is of utmost relevance, particularly during criminal investigations. In a forensic context, the 'Big Four' characteristics sex, age, size, and ethnic background—are considered to be the primary indicators of biological identification. Doctors, surgeons, medicolegal authorities, and anthropologists will be able to correctly evaluate the findings of diagnostic operations in living by using the mandible and its variations in age, sex, and race(7). The mandible is a useful tool to analyse sexual dimorphism in fragmented bones. The pelvis and skull are the skeletal components most frequently studied for gender determination. (8)The mandible is the biggest, sturdiest, and most mobile component of the skull, and identifying it is crucial in anthropological research and medico-legal matters.(9)The routine use of panoramic

radiography as a screening technique for diagnosing dental disorders has been recommended. The main benefits of panoramic images are their wide coverage, minimal patient radiation exposure, quick acquisition time, and excellent source for retrospective investigations.(8)According to several studies, panoramic radiographs are reliable and accurate for measuring the mandible's linear and angular dimensions. Males in the current study had higher condylar, coronoid, and projection heights of the ramus than females, highlighting the fact that there are more obvious sex differences in the mandibular ramus than in the rest of the body. These results are consistent with research by Rajalakshmi Rai et al. (1940), Martin (1936), Hrdlicka (1940), and Morant et al (2007) (10). In a previous study, the bigonial breadth did not substantially differ between males and females, while the gonial angle was bigger in females. These results are in agreement with research by (10) and (11), however they are at odds with research by (12) and (13). The different results can be a function of the population and age range that were chosen.(14,15)

Conclusion: The study concludes that the determination of sex using gonial angle measurement. This study demonstrates that categorising the sample into age groups makes the data more valuable for examining the differences related sex determination. Further studies on a larger sample categorising by skull types, sex and age groups in different populations are recommended to be carried out.

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Conflict of Interest:

The author declares no conflict of interest in the present study.

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