H45 Evaluation of the Mandibular Angle as an Indicator of Sex

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The goal of this presentation is to demonstrate the utility of the mandibular angle as an indicator of sex in unknown human skeletal remains.

This presentation will impact the forensic community and/or humanity by demonstrating that the mandibular angle is a poor indicator for determining biological sex.

Determining the biological sex of unidentified human skeletal remains is one of the most crucial components of the biological profile created by the osteologist as ancestral designations and age assessments are known to be affected by this factor. The accuracy of the sex determination is in turn often dependent on which skeletal elements are present for analysis. Ideally, the *os coxae* are employed because their morphology is particularly indicative of an individual's sex. Unfortunately, the morphological features that are most useful for sex estimation are often destroyed by taphonomic forces such as erosion or scavenger activity. Additionally, the preferred elements for the estimation of sex are not always present for analysis due to their initial absence thus forcing the anthropologist to examine other elements to determine sex. The cranium also presents characteristics that are useful for sex assessment; however, these features may be damaged or lost as well. The mandible is one of the densest bones in the skeleton and is more likely to survive taphonomic forces in an archaeological or forensic context. Although, sex estimates using the mandible are generally not as accurate as other elements it is at times the only useful or available element present for analysis.

It is generally accepted and taught in classrooms that the mandibular angle is an indicator of sex, where males have a squared and more vertical angle, while females tend to have a more obtuse angle. The mandibular angle is a standard osteometric measurement taken with a mandibulometer. Standard osteometric manuals describe the measurement as the angle made by the inferior border of the body and the posterior border of the ramus. Few texts give more than a general statement about the mandibular angle, usually suggesting that it is a non-metric indicator of sex. The document that provides a numeric threshold reference is an obscure older European text that suggests that an angle > 125 degrees is female and an angle < 125 degrees is a male (Acsadi and Nemeskeri 1970).

This study examines the validity of the mandibular angle measurement as an indicator of sex using data derived from the Terry Collection and modern forensic cases. The Terry collection sample consists of 315 individuals (166 females, 149 males) of African and European ancestry. The forensic sample will be of a comparable size and composition derived from cases processed by the C.A. Pound Human Identification laboratory at the University of Florida.

Statistical analysis is performed on the sample as a whole, by ancestry group, and by sample. The percentages of individuals falling above and below the 125 degree threshold are calculated. Additionally, ANCOVA is used to determine if sex, ancestry, age, or sample have an effect on mandibular angle measurements. Preliminary results indicate that there is a great deal of overlap in mandibular angle measurements between males and females. With ancestry groups combined the 125 degree threshold misclassified 55 % of males, and 37 % of females. When controlling for ancestry the threshold misclassified 63 % of European males and 33 % of European females. The threshold misclassified 47 % of African males and 41 % of African females. The ANCOVA results indicate that ancestry has a significant relationship with mandibular angle variance; however, age and sex do not. The above results suggest that the mandibular angle is a poor lone indicator of sex and that the 125 degree threshold is not a statistically significant boundary between males and females in the samples. When attempting to determine the sex of an individual it is necessary to use as many indicators as possible, although the mandibular angle is a poor indicator of sex this study did not investigate its usefulness for sex estimation with other traits. Additionally, the results indicate that population differences exist and require further exploration along with other indicators to determine the relationship between sex and ancestry.

Mandibular Angle, Sex Determination, Forensic Anthropology

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