H52 Postcranial Osteometric Analysis of Korean Ancestry

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After attending this presentation, attendees will have an understanding of a new method of ancestral classification that can be utilized when only postcranial remains are available as well as the regions of the skeleton yielding the greatest predictive ancestral accuracy when using osteometric sorting measurements and standard maximum length measurements.

This presentation will impact the forensic science community by providing information on a new postcranial method for the determination of ancestry and by providing forensic anthropologists an assessment which can be applied to incomplete or fragmentary remains, thereby increasing the possibility of identification.

Determination of ancestry is an important step in the development of the biological profile, which is made more challenging when the skull is not present for analysis. Previous postcranial research has focused heavily on differentiating Europeans and Africans from one another. When an Asian skeleton is present in ancestry analyses, the sample population is frequently limited to Native Americans. This research examines the potential to correctly predict ancestral classification of remains using an Asian sample from South Korea and African, and European samples from four collections in the United States.

Osteometric sorting measurements were originally developed to assist anthropologists in sorting commingled remains. Measurements focus on morphological landmarks, minimum and maximum diameters, and minimum and maximum breadths making it so complete bones are not necessary for assessment and increasing the possible information that can be utilized from fragmentary remains. ANOVA tests were used to select measurements displaying significant differences between the three ancestral populations, and these measurements were then grouped according to their corresponding skeletal region (upper limb, hand, pelvis, lower limb, and foot). Forward stepwise discriminant function analysis then minimized the number of measurements utilized in each of the resulting functions to only the most significant. To prevent inflated classification results discovered in preliminary testing, sample populations were assessed in a two-part analysis: Koreans from Africans/Europeans and Africans from Europeans. All functions contain between one and four measurements.

Of the 14 functions synthesized to differentiate Koreans from Africans/Europeans, most had cross-validated correct classification rates of 80% or greater for Koreans and 77% or greater for the pooled African/European sample. The highest classifying function for separating both groups consisted of upper limb measurements. Of the postcranial skeletal elements measured, the clavicle, ulna, and femur were most frequently selected in analyses to distinguish Koreans from Africans/Europeans. When separating Africans from Europeans, the lower limb measurements were found to be too similar for them to be differentiated using stepwise discriminant function analysis, so only 13 functions were produced. Most of the functions when cross-validated, correctly classified Africans with 70% or greater accuracy and Europeans with 72% or greater accuracy. The best discriminating function with the highest classification rates for both Africans and Europeans consists of a combination of pelvis, lower limb, and foot measurements. Elements included in the most functions for these two ancestral groups were the sacrum, cuboid, and radius.

Independent discriminant analyses also scrutinized differences in limb proportion between Koreans and Africans/Europeans as well as Africans from Europeans through standard maximum length measurements. Analysis of the humerus, radius, and ulna separated Koreans from Africans/Europeans with a cross-validated overall accuracy of 79.8%. Maximum length of the femur and tibia had a cross-validated correct classification rate of 81.9%, while the femur alone had a cross-validated correct classification rate of 82.1%. Comparison of maximum lengths of the humerus and femur differentiated with an overall cross-validated correct classification rate of 80.9%. Maximum lengths of the clavicle, humerus, radius, and ulna were able to differentiate Africans from Europeans with a cross-validated overall accuracy of 81%. Analyses of lower limb lengths were less discriminating, but when combined with those of the upper limb, overall classification accuracy (cross-validated) was 75.6%.

Ancestry can be determined with acceptable accuracy from complete and fragmentary remains using osteometric sorting measurements. Similarities in size of Africans and Europeans make it more advantageous to determine Asian from non-Asian ancestry first, instead of attempting to predict group membership against all three groups. The skeletal elements found to be the most conducive to each of the two analyses differ due to proportional as well as size differences. Further analyses are necessary to determine the potential influence sex may have on ancestral classification.

Postcranial, Osteometrics, Ancestry

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