H47 Applicability of Femur Subtrochanteric Shape to Ancestry Assessment

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After attending this presentation, attendees will understand the advantages and limitations of utilizing femur subtrochanteric shape in distinguishing between ancestral groups during the analysis of fragmentary and/or incomplete skeletonized remains.

This presentation will impact the forensic science community by testing the applicability of the platymeric index, a relatively common postcranial ancestry determination method, on samples of modern Southeast Asian and white American individuals.

The determination of ancestry from postcranial skeletal remains presents a significant challenge to forensic anthropologists in the analysis of fragmentary and/or incomplete remains. Morphological and metric observations from the femur can be used to differentiate between broad ancestral groups. In particular, metric dimensions of the subtrochanteric region are believed to assist in distinguishing between individuals of Asian and non-Asian descent (Bass 2005; Brothwell 1981; Gilbert and Gill 1998; Wescott 2005). To determine the shape of the subtrochanteric region, the platymeric index is calculated by dividing the subtrochanteric antero-posterior diameter by the subtrochanteric medio- lateral diameter and multiplying by 100 (Wescott 2005). It is believed that individuals of Asian descent typically exhibit a medio-laterally broad (platymeric) subtrochanteric region with platymeric indices below 84.9, while non-Asian individuals typically exhibit a more rounded (eurymeric) subtrochanteric region with platymeric indices between 84.9 and 99.9. Less frequently, individuals may exhibit an antero-posteriorly broad (stenomeric) subtrochanteric region with platymeric indices over 100; however, the data to support the association of platymeria with Asian ancestry were collected from small samples composed largely of pre-contact Native American individuals. This can be partially attributed to the makeup of the skeletal collections used for skeletal biology research in the United States, which lack significant numbers of Northeast and Southeast Asian individuals. Ancestry assessment methods derived from North American samples, such as the platymeric index, have not been rigorously tested on other Asian samples. Thus, it is unclear whether such methods can be utilized to identify individuals of Northeast and Southeast Asian descent in a forensic context.

This dearth in research is of particular concern to the forensic anthropologists at the Joint POW/MIA Accounting Command's Central Identification Laboratory (JPAC-CIL), where casework routinely requires ancestry assessment of highly fragmented or incomplete remains that were recovered from, or unilaterally turned over by, Asian countries. The primary goal of the JPAC-CIL is to recover and identify U.S. service members killed during past conflicts, including the World Wars, Korean War, and Vietnam conflict. The ability to distinguish between the remains of Southeast Asian and Black and White American males is integral to accomplishing this goal.

As many JPAC-CIL cases exhibit extensive peri-mortemtrauma (i.e., from aircraft crashes and projectile trauma) and originate from extreme postdepositional environments (i.e., highly acidic soils and humid jungle environments), fragmentation of remains is common. However, due to its robusticity, the femur is often represented in casework assemblages, making it an important skeletal element for sex, age, race, and stature estimation.

This study tests the applicability of the platymeric index on a sample of 128 modern Southeast Asian males (age 23-96 years) housed at Khon Kaen University (KKU), Khon Kaen, Thailand, and 77 White American males (age 18-41 years) identified by the JPAC-CIL, Hickam AFB, Hawaii. The KKU skeletal collection consists of more than 600 known individuals from northern Thailand. The JPAC-CIL sample consists of U.S. servicemembers who died during World War II, the Korean War, and the Vietnam conflict. Measurements were obtained with standard anthropometric sliding calipers and rounded to the nearest millimeter. The platymeric index of the left femur was calculated; however, the right femur was substituted if the left was damaged or missing.

While results indicate that the KKU sample contains a larger number of platymeric femora, both samples exhibit variability in subtrochanteric form. In the KKU individuals, platymeric indices range from 64.1 to 109.6 and are normally distributed (mean = 83.9; S.D. = 7.36), with 58% exhibiting platymeric, 39% exhibiting eurymeric, and 3% exhibiting stenomeric femora. In the JPAC-CIL sample, platymeric indices range from 76.5 to 118.4 and are normally distributed (mean = 91.6; S.D. = 10.2), with 44% of individuals exhibiting eurymeric, 36% exhibiting platymeric, and 19% exhibiting stenomeric femora. Differences in the mean platymeric indices for the two samples are statistically significant ($p \leq 0.001$), with the KKU platymeric index range generally lower, and the JPAC-CIL range generally higher; however, the considerable overlap in the ranges urges caution when using platymeric indices in ancestry assessment.

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