A40 The Utility of Clavicular and Humeral Non-Metric Sex Assessment Methods in Japanese and Thai Individuals

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After attending this presentation, attendees will understand how select non-traditional, non-metric traits of the clavicle and humerus can be used in a statistical framework to ascertain the sex of Japanese and Thai individuals.

This presentation will impact the forensic science community by providing population-specific clavicular and humeral sex assessment methods for use when the traditional non-metric traits of the pelvis and cranium are absent.

Sex is one of the most important components of the biological profile as it can exclude roughly half of the population and it dictates the methods used in age, ancestry, and stature estimations. While the non-metric traits of the pelvis and cranium are used regularly and reliably in forensic and bioarchaeological sex assessment, trauma, taphonomic alterations, and incomplete recovery may preclude their inclusion in the biological profile. Therefore, it is necessary to develop, validate, and refine sex assessment methods on other sexually dimorphic regions of the skeleton that may be variably preserved, including the clavicle and humerus. The infero-medial clavicle serves as an attachment point for the costoclavicular ligament, and it is hypothesized that males more frequently show an excavation (rhomboid fossa) in this area. Sexually dimorphic differences in the distal humerus are attributed to differing female and male carrying angles; however, these non-traditional sex assessment methods were developed, validated, and refined in North America on individuals of African and European descent. Until relatively recently, Asian populations have remained understudied in forensic anthropological research, which is problematic in worldwide forensic contexts.

This study explores the expression of clavicular rhomboid fossae and distal humeral morphology in 1,397 Japanese and Thai individuals, 17 to 96 years of age. The Japanese sample is composed of 209 individuals from the late 19th to early 20th centuries (Chiba University) and 572 individuals from the modern era (Jikei University) (*f*=219; *m*=562). The Thai sample is composed of 616 individuals from the modern era (Khon Kaen and Chiang Mai Universities) (*f*=198; *m*=418). The rhomboid fossa of the medial clavicle was assigned an ordinal score based on the degree of expression and presence or absence. Similarly, the sexually dimorphic traits of the distal humerus (trochlear constriction, trochlear symmetry, olecranon fossa shape, and angle of the medial epicondyle) were assigned an ordinal score based on their "female-like" or "male-like" expression. Percentages, probabilities, and chi-square statistics were calculated to determine if differences exist between the sexes and populations. Subsequently, binary logistic regression equations and Chi Square Automatic Interaction Detection (CHAID) decision trees were calculated to identify the distal humeral traits that perform best in differentiating females and males. Additional non-parametric tests examined the effects of age and intraobserver error.

Overall, the results indicate that the methods developed on non-Asian populations exhibit reduced discriminatory power when applied to the Japanese and Thai populations. Concerning the clavicle, the majority of females and males (56.9%–97.4%) lack a rhomboid fossa; however, the presence of a fossa indicates male with a probability of 70%–91%. The left clavicle is more sexually dimorphic than the right. Concerning the distal humerus, 42%–85% of the individuals were correctly classified using the traits individually, while 68%–94% were correctly classified using a population-specific composite scoring method. Males were more correctly classified, and the angle of the medial epicondyle performed the best, while trochlear constriction performed worst. Further, the clavicular and distal humerus traits are influenced by age at death, population, and intraobserver error, thereby possibly complicating their use in sex assessment.

Though less accurate than the pelvis or cranium, this study demonstrates that clavicular and humeral morphology can be used in the absence of traditional non-metric traits to estimate the sex of Japanese and Thai individuals. Moreover, the findings underscore the importance of developing population-specific sex assessment methods for diverse Asian populations, as the Japanese and Thai are somewhat less sexually dimorphic than non-Asian populations and differ from each other.

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