A25 A Validation Study of Sex Estimation From the Scapula and Clavicle in a Modern United States Population

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After attending this presentation, attendees will understand the applicability of a sex estimation technique developed on an archaeological collection in New Zealand in a modern context.

This presentation will impact the forensic science community by providing an applicable sexing technique with high accuracy for use in cases where the os coxae and cranium are not available or are poorly preserved.

In forensic anthropology, sex is one of the first attributes reviewed by forensic anthropologists.[1-6] Finding complete remains of an individual increases the chances of correct identification; however, frequently only incomplete remains are found. For this reason, new sex estimation methods and the validation of existing methods using various bones in the body are necessary.[7-11]

The clavicle and scapula are comparable to the os coxae, sacrum, and coccyx, which form the pelvic girdle, the base that supports the appendicular skeleton of the lower half of the body. Because of a relatively high degree of sexual dimorphism in the human os coxae, more attention has been given to those elements in the development of new accurate methods for sex estimation. The pectoral girdle shows less obvious sexual dimorphism, but promising traits on the clavicle and scapula have been documented, with reportedly high degrees of accuracy.[12]

In this study, a technique developed by A.M.C. Murphy using an archaeological sample from New Zealand was tested on the William M. Bass Donated Skeletal Collection at the University of Tennessee.[13] Sliding calipers were used to measure the diameters of the sternal and acromial end of the clavicle and height and breadth of the glenoid fossa of the scapula. Data were obtained from 125 females and 121 males during the current study. Only adult individuals with fused epiphyses were used and left elements were given preference to prevent potential inconsistencies in right-handed asymmetry. Furthermore, only individuals of White ancestry were measured due to their larger sample size within the collection. Discriminant function analysis was then applied through the use of the statistical program Statistical Package for the Social Sciences (SPSS) by IBM® to test Murphy's method.

Statistical analysis shows the discriminant function as statistically significant with a Wilk's lambda of 0.394 and significance level of .000, which indicates that the function can effectively discriminate between males and females with an accuracy rate better than chance. The coefficient with the greatest discriminating ability is glenoid breadth, and the least discriminating coefficient is sternal diameter. An 89.9% accuracy rate in estimating sex was reached with a sectioning point of 0.0205.

A second statistical analysis tested the accuracy of this function as it applies to younger age-at-death versus older age-at-death individuals. The researcher chose the differentiating point of 50 years of age. Discriminant function analysis was applied first to those less than 50 years old and then to those older than 50 years of age. The accuracy rate in correctly estimating sex increased for individuals less than 50 years old to 92.9% and for individuals older than 50 years of age to 90.7%.

Although the method applied to this modern United States population sample did not reach Murphy's 97.7% accuracy rate, this study will present an anthropological method that can be applied to current forensic cases involving unidentified individuals where other methods of identification are unattainable that portrays a statistically significant accuracy rate of 89.9% in correctly estimating sex.

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Forensic Anthropology, Sex Estimation, Pectoral Girdle