

A46 Osteometric Sorting of Commingled Upper Limb Bones

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After attending this presentation, attendees will understand the utility of using metric methods for sorting commingled human remains.

This presentation will impact the forensic science community by providing a statistically valid means of sorting commingled remains when traditional non-metric methods need to be supplemented.

Long bones of the arm and scapula are reported to be reliable for sex determination and stature calculation.^{1,2} Therefore, in a commingled context, it is crucial to assess that these bones correspond to the same individual. In this framework, the present study sought to develop a number of functions for sorting commingled human scapulae, humeri, ulnae, and radii using linear measurements of these bones' articular surfaces.

For this purpose, a number of linear measurements was performed: the maximum height and breadth of the glenoid fossa, the maximum vertical head diameter and the maximum anterior-posterior head breadth of the humerus, the capitulum-trochlea breadth, the maximum olecranon breadth, the minimum olecranon breadth, the ulnar radial notch height, the maximum head diameter of the radius, and the vertical radial head height. All 222 individuals included in the study belong to the Athens Collection.³ This skeletal collection consists of individuals of known sex, age, occupation, and cause of death. They lived in the second half of the 20th century in Athens, Greece, and their biological age ranged between 20 and 99 years.

Simple and multiple linear regression analyses produced a total of 11 equations (7 simple and 4 multiple regression equations) as the best statistical models for predicting measurements of one skeletal element using measurements of another. The standard error of the estimate ranged between 0.88mm-1.59mm for the simple regression formulas and 1.41mm-1.58mm for the multiple regression formulas. Pearson's correlation coefficient ranged between 0.69-0.93 (sig. <0.05) showing statistically significant strong positive correlations among measurements. The coefficient of determination (r^2) scored overall higher in multiple regression analyses (0.71-0.86) compared to simple regression analyses (0.47-0.83). Sex and bilateral asymmetry did not have a statistically significant effect on the methods accuracy.

In conclusion, the regression equations developed in this study were found to be suitable for sorting commingled upper limb skeletal elements. The development of similar methods for other joints of the human skeleton would be beneficial for the anthropological analysis of commingled remains.

Reference(s):

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2. Stewart T.D., Kerley E.R. *Essentials of Forensic Anthropology: Especially As Developed in the United States*. Springfield, IL: Charles C. Thomas; 1979.
3. Eliopoulos C., Lagia A., Manolis S. A modern, documented human skeletal collection from Greece. *HOMO – Journal of Comparative Human Biology*. 2007; 58(3):221–228.

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