H92 Sexual Dimorphism of the Humerus in Contemporary Cretans

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The goal of this research is to facilitate the determination of sex which constitutes a very important aspect of a forensic investigation, by providing a simple and easy sex determination technique using the humerus.

A specific standard for sex estimation for a modern Cretan population is attempted here. Establishing this standard will impact the forensic science community by assisting the Greek and neighbouring Balkan countries when human skeletal remains are recovered from forensic settings.

The present study is aiming to facilitate the determination of sex which constitutes a very important aspect of a forensic investigation, by providing a simple and easy sex determination technique using the humerus. When decomposed, skeletonised bodies or body parts of unknown identity are recovered, a forensic anthropologist is considered expert in determining sex from skeletal remains using a variety of techniques in order to make the ultimate decision. In medico-legal routine though such experts are not always available, especially in Greece where there are no forensic anthropologists.

Therefore this study is an attempt to develop a sex identification technique that can be easily applied to a decomposed body. The measurements chosen are easy to be taken after when the remains are all decomposed or skeletonised. Taking under consideration the population aspect of sexual dimorphism of the skeleton, the present study aims to create a sex identifi- cation technique using osteometric standards applied to a contemporary Cretan sample.

The skeletal material for this study is selected from the cemeteries of St. Konstantinos and Pateles, Heraklion, Crete, Greece. The bones are gathered, cleaned and placed in boxes and stored in an ossuary. Unless living members of a deceased person can afford to keep them in the tomb with a “rental” fee it is to be destroyed. Authors were given permission to analyze a limited number of unearthed remains in order to carry out a population based investigation. The study population consists of individuals who lived between the end of the 19th century and the beginning of the 20th and buried in Crete. Sex is available for all individuals while age at death and cause of death for only part of it. A total of 84 male and 84 female left humerii are measured according to standard osteometric techniques. Mean age for males is 68, 57 +/- 13.52 (N=61) and for females 72, 98 +/-16, 90 (N=58). The following measurements were taken: maximum humeral length (mean: 321.3 mm in males; 293.4 mm in females), vertical humeral head diameter (mean: 46.38mm in males, 41.19mm in females), midshaft maximum diameter (mean: 22.55mm in males, 20.11mm in females), midshaft minimum diameter(mean: 18.53mm in males, 15.58mm in females), midshaft circum- ference(mean: 65.93mm in males, 58.12mm in females), humeral epicondylar width (mean: 61.66mm in males, 54.40mm in females).

The differences between the means in males and females were signif- icant $p<0.0005$) with the exception of age at death which resulted insignificant. About 92.3% of cases were correctly classified when all measurements were applied jointly. Stepwise discriminant function analysis selected only four dimensions (maximum humeral length, vertical humeral head diameter, midshaft minimum diameter and humeral epicondylar width) producing an accuracy rate of 92.9%. Assuming different fragmentary patterns multiple functions were generated giving an accuracy rate from 83.3 to 89.9%. The most effective single dimensions as determined by direct discriminant analysis were vertical head diameter (89.9%) followed by minimum midshaft diameter (86.3%).

Classification accuracy is higher when compared to similar studies of Chinese and Japanese but lower when compared to German, Portugal and Guatemalan populations (Carretero et al. 1995; Iscan et al. 1998; Mall et al. 2001; Frutos 2005). Interestingly humerus demonstrates higher sexual dimor- phism than skull (88.20%) and femur (91.1%) in the same population.

The recovery of fragmentary and pathological skeletal remains, in forensic investigations, requires easy and rapid techniques for biological profiling and reconstruction of the scene history. There is no doubt that popu- lation differences affect sexual dimorphism reflected in the humeral dimen- sions. Thus a specific standard for sex estimation for a modern Cretan population is attempted here. This standard is expected to be applicable for Greeks and neighbouring Balkan countries in which human skeletal remains are recovered from forensic settings. Simple measurements accessed during autopsy can provide an immediate and accurate prediction of sex, thus contributing significantly to positive identification in forensic cases.

Forensic Anthropology, Humerus, Sex Identification

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