H87 Sex Determination Using the Calcaneus in Koreans

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After attending this presentation, attendees will understand the utility of sex determination using the calcaneus and an example of a practical application of unknown skeletal remains for sex determination.

This presentation will impact the forensic science community by suggesting the possibility for sex determination using the calcaneus when analyzing a Korean skeletal sample. This study is the first to test use of the calcaneus for sex determination by discriminant function analysis in Koreans. The results will be helpful for sex determination and distinguishing population differences in the calcaneus.

Sex determination from skeletal remains is of major interest to forensic anthropologist and important variable for personal identification. The calcaneus is the largest of the foot bones and is often recovered intact in forensic cases. The skull and many bones, such as the femur, tibia, and humerus, have been used for sex determination but the calcaneus has not been sufficiently assessed for use in individual identification. The aim of this study is to define an equation for sex determination using discriminant function analysis and compare with other populations.

The sample consisted of 90 sets of the dry calcaneus of known age and sex at Department of Anatomy, Yonsei University College of Medicine in Korea. The calcaneal sample consisted of 63 males and 27 females. The method was investigated based on 10 metric variables: three length measurements, three breadth measurements, and four height measurements. Data was statistically analyzed with the computer program SPSS 17.0.

Bilateral asymmetry was assessed using paired t-tests. Four of the 10 measurements differed significantly between the right and left sides ($P < 0.05$). Most measurements (nine of 10), showed statistically significant difference between sexes ($P < 0.05$). A discriminant function analysis was applied to assess accuracy for both the right and left sides. The accuracy of discriminant function analysis was 87.2% for the right side, and 81.6% for the left side. For the right side, the discriminant function is: D = 0.227 x (maximum height) + 0.227 x (cuboidal facet height) – 16.062. The sectioning point is -0.7296. The canonical correlation of discriminant function is 0.610, and Wilk's Lambda is 0.627. For the left side, the discriminant function is: D = 0.368 x (dorsal articular facet length) + 0.248 x (dorsal articular facet breadth) – 16.808. The sectioning point is -0.8047 and the canonical correlation is 0.66, and Wilk's Lambda is 0.564. The statistical results indicate that it is possible to discriminate between males from females using measurement of the calcaneus

Bidmos and Asala among other studies used measurements similar to this study. Bidmos and Asala (2003, 2004)[1,2] concluded that the calcaneus of a South African sample showed statistically significant differences between sexes. The accuracy of discriminant function analysis was 90.6% in South African White, and 85.3% in South African Black using stepwise discriminate function analysis. The discriminant equation was composed three variables in Bidmos and Asala and two variables in this study. The variables used are different between the South African and Korean samples. The results of the two studies indicate that the calcaneus is useful for sex determination of unknown skeletal remains. Furthermore, this study will be compared with other studies in detail, we can distinguish among populations.

References:

1 Bidmos MA and Asala SA. Discriminant function sexing of the calcaneus of the South African Whites. *J Forensic Sci* 2003; 48:1213-8.

2 Bidmos MA and Asala SA. Sexual dimorphism of the calcaneus of South African Blacks. *J Forensic Sci* 2004; 49:446-50.

Calcaneus, Sex Determination, Korean

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