



Physical Anthropology Section – 2008

H90 Sex Determination of Talus in Korean Using Discrimination Function Analysis

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This presentation suggests that the talus could be helpful for sex determination in forensic anthropologic field, as the dimension of the talus is highly dimorphic between male and female in Korean and the discrimination function analysis classifies sex with high accuracies.

The talus of Korean is useful for sex determination in either case of complete or fragmentary state as the discrimination function equations obtained from nine measurements are specific for sex determination of Korean with high accuracy.

The determination of the sex is essential in human identification, as it makes the matching possibility decreased by half. The sex of the unknown individual is determined mainly by non-metric methods observing the anatomical elements with sexual differences on bones. This method is dependent on the presence or absence of these elements. Although the elements are as complete as possible to obtain accurate results, incomplete or fragmentary bones are more often excavated in forensic cases. Then, it is needed to devise analytical methods considering fragmentation. Statistical analysis using metric methods provides more reliable and quantifiable estimation than non-metric methods.

Talus, one of the tarsal bones, is a useful bone for human identification that is preserved more intact during the recovery of human skeletons compared with long bones as its hardness and is readily distinguished even in fragmentary state as its characteristic morphology. Besides the merits of the talus in excavation, several statistical studies on the talus of the population groups excluding East Asian populations suggested that the discrimination function using metric data of this bone is able to classify sex with high accuracy. Therefore, it is the aim of this study to investigate the sex discriminating potential of the metric data from the talus in Korean, one of East Asian populations, and compare with other analyses on White and Black populations.

The descriptive and discrimination function analyses were performed on the data acquired from the nine measurements, referred to by Steele (1976) and Bidmos et al. (2003), taken from 165 tali (118 male, 47 female) in Yonsei University of Korea. The talus of Korean is highly dimorphic between male and female as there were significant differences in all measurements ($P < 0.01$). The discrimination function equations were generated by univariate, bivariate, and step-wise methods. In the equations obtained from one variable, the equation using talar width had the highest accuracy of sex classification in 86.7% and the range of accuracy of each equation was 72.7% to 86.7%. The range of accuracy of the equations using two variables was 80.0% to 87.9% and the equation from talar width and height of head classified sex with the highest accuracy in 87.9%. The analysis by step-wise method selected the best 2 out of the 9 measurements: talar width and talar height. The accuracy of the equation by step-wise method was 86.1%. The reason why the step-wise analysis selected talar width and talar height instead of talar width and height of head which were the variables of the equation with the highest accuracy in bivariate analysis might be that Wilk's lambda in talar width and talar height was higher.

In comparison with other population groups studied by Steele (1976), Bidmos et al. (2003, 2004), the talus of Korean had generally similar dimensions of White and Black populations except for South African Black with smaller dimensions than Korean. In the discrimination functions, the variables with accuracies over 80.0% are different from each population and the variables selected by step-wise method are also different. These results show that the variables with high accuracy in this study are specific for sex determination of Korean.

Any equation calculated from one or two variables among nine measurements in this study provides high accuracy (72.7% ~ 87.9%). It is concluded that the talus of Korean is useful for sex determination in either case of complete or fragmentary state.

References:

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