H79   The Utility of Dental Crown Size in the Assessment of Ancestry

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After attending this presentation, attendees will understand how tooth crown size varies between sexes and broad geographically based groups.

This presentation will impact the forensic science community by identifying an additional method for the assessment of ancestry that can be adopted by the forensic anthropologist as part of the development of the biological profile.

Data were collected from the dentition of populations representing multiple geographic regions throughout the world (n>5,600). Buccolingual and mesiodistal crown measurements were taken for one side of the dental arcade, for a total of 32 metric variables per individual. Data were coded into one of three geographically based ancestral groups: African; Asian; and European. Data were then explored to identify differences between these groups. A general pattern was identified wherein African populations have the largest teeth, Asian populations are intermediate in tooth size, and European populations have the smallest teeth, although Asians tend to have slightly larger anterior teeth than Africans. Univariate Analysis of Variance analyses (ANOVA) identified differences between the sexes in all metric variables except for three mesiodistal measurements on anterior teeth (upper second incisor, and lower first and second incisors). Observer error was evaluated in this study and found to be low, as reported in other studies using dental metrics.

A subset of this larger dataset, which includes only those individuals with complete dentition (n=508), was used to identify the efficacy of crown size in discriminating between ancestral groups. Models performed best when all teeth were included with the exception of the third molars, which were often missing or otherwise highly variable. Discriminant function analysis correctly classified individuals into one of the three ancestral groups, regardless of sex, in 71.3% of cross-validated cases. Further analyses identified sex differences between groups as the leading cause of misclassifications. Therefore, data were divided into ancestral group and sex. When sex is known, classification rates are improved; up to 88.1% of cross-validated cases in females, and 71.9% of cross-validated cases among males.

This study identifies broad patterns in crown size related to ancestry and sex. Dental measurements have the potential to be analyzed in a similar fashion to cranial measurements; therefore, a large database can be adopted for assessment of ancestry. Moreover, data on tooth dimensions can be quickly recorded with low observer error by individuals with only limited training. Based on these results, data on crown size can be included as part of the biological profile.

Dental Metrics, Ancestry, Discriminant Function