A63   Craniometric Variation of Modern Asian and Hispanic Individuals Using Multivariate Analysis

Nandar Yukyi, MA*, Defense POW/MIA Accounting Agency, 501 Park Avenue, Apt 429, Omaha, NE 68105; and Kate Spradley, PhD, Texas State University, Dept of Anthropology, 601 University Drive, San Marcos, TX 78666

After attending this presentation, attendees will understand how cranial morphologies of certain modern Asian and Hispanic individuals compare to each other, and that population histories of different ancestral groups influence their cranial morphologies.

This presentation will impact the forensic science community by providing a deeper understanding of how Asian and Hispanic groups relate based on craniometric analysis.

According to Dudzik and Jantz, there have been a high number of misclassifications between Hispanic and Asian populations in the ancestry estimation software FORDISC®, as reported by forensic anthropologists.[1] In order to avoid mistaking an unknown Asian individual as Hispanic, or vice versa, it is beneficial to conduct further research on cranial morphological comparisons between these two groups with shared ancestry. This study primarily examines how modern Asian and Hispanic groups classify when compared with each other, as well as with other groups. Further, this study investigates any patterns of misclassification observed among and within the population groups used. Finally, this study examines how the samples used classify when ran with reference sample groups currently available on ancestry estimation programs such as FORDISC® 3.1.

The Asian samples included male and female individuals belonging to ten different population groups from East and Southeast Asia (*n*=575). All Asian data were either provided by Dr. Michael Pietrusewsky or obtained from the Howells craniometric database. The Hispanic samples in this study originated exclusively from Mexico (*n*=114) and, thus, are considered one population group. All Hispanic data were provided by Kate Spradley, PhD. Additional samples from the Forensic Anthropology Data Bank (FDB) were included in a second analysis with the initial sample pool to investigate how well Asian and Hispanic samples would classify when other ancestral groups were added for analysis. FDB samples (*n*=524) included American Whites, American Blacks, and Guatemalans. This study utilized 27 cranial Interlandmark Distances (ILDs), some of which are not standard distances used in FORDISC® 3.1; however, they were based on their overall representation of cranial morphology. The ILDs were analyzed using Discriminant Function Analysis (DFA) and canonical variates analysis to assess the similarities and differences in cranial morphologies of the samples, which were separated by sex. Last, 20 male samples were chosen randomly out of the original 11 Asian and Hispanic groups (*n*=588) and ran in FORDISC® 3.1. The purpose was to investigate how the samples from this study would classify when run with the Asian and Hispanic reference groups that are currently available to forensic anthropologists.

Results demonstrated that cranial morphologies of Asian and Hispanic groups are distinguishable. Hispanics represented by individuals originating from Mexico generally exhibit wider faces and nasal apertures compared to most East and Southeast Asians. Some Asian groups, such as North Japan, Ainu, and Philippines, also exhibit similar features to Mexicans. Overall, Mexicans display wider faces and nasal apertures than most Asian groups. Results from the second analysis yielded lower correct classification rates when run with the FDB samples (78.6% without and 71.9% with FDB groups).

Further, Hispanics are generally more similar to American Blacks and Whites than most Asian groups, which contradicts the findings of Dudzik and Jantz.[1] This may be attributed to the utilization of non-standard ILDs in this study, which is consistent with the findings of Spradley and Jantz that non-standard ILDs yield more accurate ancestry estimations, especially for complex groups.[2] Thus, it may be worthwhile to include non-standard ILDs when estimating ancestry for Asians and Hispanics in future research. Differences in cranial features help distinguish Asians and Hispanics from one another. Quantifying the influence that different cranial ILDs have on ancestral group assignment aids in understanding which facial and cranial features are important to differentiate Asians from Hispanics.

Reference(s):

1. Dudzik B., Jantz R.L. 2016. Misclassifications of Hispanics using FORDISC® 3.1: Comparing cranial morphology in Asian and Hispanic populations. *J Forensic Sci.* 61(5):1311-1318.
2. Spradley M.K., Jantz R.L. 2016. Ancestry estimation in forensic anthropology: Geometric morphometric versus standard and nonstandard interlandmark distances. *J Forensic Sci.* 61(4):892-897.

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*Presenting Author