A21 Geographic Origin Estimation of Latin American Individuals Using Craniometric Data

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Learning Overview: After attending this presentation, attendees will understand how geographic origin estimation in forensic anthropology can provide a finer-grained approach than ancestry identification.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by further exploring the biological variation found in Central America and Mexico to help improve biological profile methods for unidentified migrants.

The lack of information surrounding the term "Hispanic" creates difficulties when attempting to estimate geographic origin due to the variation encompassed by this term. Exploring the biological variation between Mexican and Guatemalan populations allows for investigation of geographic origin rather than the classification systems currently utilized in forensic anthropology. If geographic origin can be estimated based on craniometric measurements, it could potentially narrow a missing person's list. This could also be used to help facilitate and potentially expedite the identification and repatriation of unidentified migrants. The purpose of this presentation is to use positively identified and contextually documented individuals from Mexico and Guatemala to explore the variation within and among these two geographic regions, as well as sub-regions, to provide a foundation for improving ancestry estimation. Moreover, this research attempts to address the following questions: (1) Can a reference sample of Guatemalans, used as a proxy for Central America, be distinguished from a Mexican population via cranial morphology? (2) Can sub-regions (Central, North/West, and Southeast) of Mexico and Guatemala be distinguished from each other via cranial morphology?

To answer these questions, this research utilizes individuals from four institutions, including the Pima County Office of the Medical Examiner, the Forensic Anthropology Foundation of Guatemala, Operation Identification at Texas State University, and the School of Anthropological Sciences of the Autonomous University of Yucatán, at Mérida. Together, this sample includes individuals migrating to the United States from Guatemala and Mexico and indigenous Guatemalan Mayans. Howells inter-landmark distances were collected from each cranium using a MicroScribe® digitizer and the program 3Skull.[1,2] A discriminant function analysis and canonical variates analysis were performed to assess the variation and classify the individuals. The Guatemalan sample can be correctly classified 75.25% of the time when compared to Mexicans, and the cross-validation rate suggests that when the three Mexican regions are compared (Central, Southeast, and North/West), they can be differentiated 77.8% of the time. The Mahalanobis Distance matrix from the regional comparison indicates the Southeast Mexico group is statistically different from the Central and North/West groups ($p=<0.001$). When Guatemalan Mayan individuals are included in the Mexico regional comparison, the cross-validation rate decreased, but the Mahalanobis Distance matrix showed that the Southeast group and the Guatemalans were statistically different from all groups. With Guatemala used as a proxy for Central America, complex craniometric patterns have begun to emerge that need further exploration. These results suggest that other regions of Central America are also distinguishable from Mexico. This research indicates that even though the three regional Mexican groups can be separated, the large difference in cranial variation is between the Southeast region and the remainder of Mexico. Considering these patterns, this research indicates geographic origin estimation can be used in lieu of broad ancestry estimation in forensic casework. This could potentially eliminate broad terms such as Hispanic, which are less informative in a forensic setting, particularly when considering migrant remains.

Reference(s):
[1.] Howells W.W. *Cranial Variation in Man. A Study by Multivariate Analysis of Patterns of Difference Among Recent Human Populations.* Paps Peabody Museum of Archaeology and Ethnology, 67: 259. Cambridge, Mass: 1973.
[2.] Ousley, S.D. 3Skull 2.0.77. http://www.mercyhurst.edu/departments/applied_forensic_sciences/faculty_staff.html. 2004.

Latin America, Craniometrics, Biodistance