A6   Ancestry Estimation Using Vertebrae: Koreans Versus United States Whites

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Learning Overview: After attending this presentation, attendees will understand that vertebrae have a potential to be used for ancestry estimation, particularly when discerning between Korean and United States Whites.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by exploring the potential usage of vertebrae as an ancestry indicator, which has seldom been studied previously. Ancestry estimation using vertebrae will enhance the likelihood of identification of unknown victims, particularly when their crania are missing or seriously damaged.

Ancestry is one of the key components of the biological profile which forensic anthropologists reconstruct to identify unknown skeletal remains. Extensive effort has been made to estimate ancestry primarily using the morphological and metric features of the crania and teeth. Some postcranial bones have also been studied for this purpose, but the vertebrae still remain as one of the least-favored bones in ancestry estimation. However, the fact that body proportions such as the Cormic index (i.e., ratio of the sitting height to the total height) differ between populations implies that different populations would have different vertebral heights.[1] In this regard, this study explores whether vertebrae can make a meaningful contribution to ancestry estimation, specifically when Korean and United States Whites are to be discerned from each other.

Vertebral heights from C2 to L5 were measured from 317 Korean skeletons (184 males and 134 females housed in eight institutions of South Korea) and 215 United States White skeletons (109 males and 106 females at the William Bass Donated Collection of the University of Tennessee), following the instruction of Raxter et al.[2] Then, the discriminant function analyses were conducted on C2–L5, C-column (summed heights of C2–C7), T-column (summed heights of T1–T12), L-column (summed heights of L1–L5), and V-column (summed heights of C2–L5), respectively. Males and females were analyzed separately.

Overall, individual vertebral heights and column heights exhibited decent-to-good Correct Classification Rates (CCR). When it came to individual vertebrae, CCRs range 62.1% (C3) ~ 86.5% (L5) and 50.6% (C7) ~ 81.4% (L5) for females and males, respectively. Except for T5, females exhibit higher CCRs than males in all vertebrae by 1.3% (T3) ~ 17.8% (T10). CCRs of L-column (88.4% and 81.0% for females and males, respectively) were higher than the other columns or the whole vertebral column for both sexes. T-column marked the lowest CCRs (73.6% for females and 59.0% for males) among vertebral columns.

Based on the decent CCRs associated with the vertebrae and vertebral columns as well as the convenience of vertebral height measurement, it is expected that vertebrae can be used as a useful indicator for ancestry estimation. When all lumbar vertebrae are present, their summed height will be particularly useful to discern Korean from United States Whites for both sexes. It was also noted that L5 alone can produce as high CCRs as the L-column.

Reference(s):

1. Jeong Y, Jantz LM. 2016. Developing Korean-specific equations of stature estimation. *Forensic Science International* 260:105.e1 105.e11.
2. Raxter MH, Auerbach BM, Ruff CB. 2006. Revision of the Fully technique for estimating statures. *American Journal of Physical Anthropology* 130(3):374-384.

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