



A12 Tall Tales: Various Regression Stature Methods Applied to the Huntington Collection

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Learning Overview: After attending this presentation, attendees will be aware of secular change in human populations and how these changes affect stature estimations, and, in this study, for European populations in which the individuals were born prior to the 1850s. This presentation will also demonstrate that the femur provides a more accurate stature estimation utilizing the four stature regression methods employed in this study.

Impact on the Forensic Science Community: This presentation will impact the forensic science community and the bioanthropological community by alerting them to be cognizant of the effects of secular change on the accuracy of stature estimations when applying these methods to populations that span more than a century.

Various regression formula stature methods have been created to estimate living stature for a specific population, by sex and/or ancestry. Those commonly used stature regression methods are Trotter and Gleser, Ousley, Wilson et al., and Albanese et al.^{1,3-5} These methods measured individuals from anatomical skeletal collections coming from different time periods to develop their regression formulas. Trotter and Gleser used the Terry Collection consisting of individuals who were born in 1850 to 1900; Ousley had a mixture of individuals born pre-1944 and post-1944; Wilson et al. used individuals born post-1944; and Albanese et al. used individuals born from 1839 to 1914.^{1,3-5} These methods, despite their common use, each have a level of error if applied to a population not used for producing their regression formulas. Even if all collections are of European ancestry, the variation due to secular change between these population groups will cause some error. This study tested the accuracy of Trotter and Gleser, Ousley, Wilson et al., and Albanese et al. regression stature methods by applying them to the femur and humerus of individuals from the Huntington Collection.^{1,3-5} The Huntington Collection is composed of European immigrants born between 1827 and 1881 (pre-1900), thus being essentially a generation prior to the Terry Collection and earlier than the birth dates of the other collections used.²

The sample consisted of 49 individuals of known height: 27 males and 22 females. The sample size was somewhat restricted by the individuals that had recorded stature and both the humerus and femur from the same individual. The maximum length measurement of the humerus and femur were applied to each method for the White male and White female category. In all four methods, the femur had a lower average difference than the humerus. This reaffirms that the femur is the more effective element to use for regression stature estimation. This is, of course, due to its more direct contribution to height. The Albanese et al. femur regression formula provided the most accurate result with an average difference of 0.94 cm from the actual stature.¹ This is undoubtedly due to Albanese's sample collection time period being more similar to the Huntington collection's time period. The next accurate femur regression formula was Trotter and Gleser's (1.24cm), which used the Terry Collection.⁴ Ousley and Wilson et al. had the highest average difference, with a difference of (1.81cm) and (FSTAT 2.28/ASTAT 2.43), respectively.^{3,5}

Reference(s):

1. Albanese J., Tuck A., Gomes J., Cardoso H.F.V. An Alternative Approach for Estimating Stature From Long Bones That Is Not Population- or Group-Specific. *Forensic Sci. Inter.* 2016, 259, 59–68.
2. National Museum of Natural History. Department of Anthropology. *Anthropology*. Accessed August 20, 2018. https://anthropology.si.edu/cm/phys_intro.htm.
3. Ousley, S. Should We Estimate Biological or Forensic Stature? *J. Forensic Sci.* 1995, 40 (5), 768-773.
4. Trotter M., Gleser G.C. Estimation of Stature from Long Bones of American Whites and Negroes. *J. Physical Anthro.* 1952, 10 (4), 463-514.
5. Wilson R.J., Herrmann N.P., Jantz L.M. Evaluation of Stature Estimation From the Database for Forensic Anthropology. *J. Forensic Sci.* 2010, 55 (3), 684-689.

Stature Methods, Huntington Collection, Secular Change