F39 Validation of Three Methods of Estimating Age-at-Death From the Dentition of Modern Colombians

Clara I. Valderrama, DDS, and Edna M. Buitrago, DDS*, National Institute of Legal Medicine and Forensic, Bogota, COLOMBIA*

After attending this presentation, attendees will understand the principles and application of research in dental age determination by validating the original method proposed by Lamendin et. al (1992), as well as updates proposed by Prince and Ubelaker (2002) and González-Colmenares et al. (2007), on a modern Colombian sample of documented individuals.

This presentation will impact the forensic science community by demonstrating that the dentition can be used with some degree of success in modern Colombian populations. In addition it demonstrates that the methodology of Prince and Ubelaker (2002) performs with slightly more accuracy than the technique of González-Colmenares et al. (2007).

In the identification process, forensic practitioners are often required to estimate age-at-death from skeletal and dental tissues. While numerous methods utilize morphological structures of the post-cranial skeleton, various methodologies utilizing the dentition estimate age based on dental development, time of eruption, dental attrition, and root translucency. These methods have been developed for different populations on the basis of various morphological features and have been modified and/or applied and validated for other populations over time; however, with the exception of González-Colmenares et al. (2007), few have been specifically developed or tested on modern Colombians.

Therefore, this study validated three techniques that each utilize periodontosis and root translucency to estimate age-at-death. The techniques included Lamendin et. al (1992), Prince and Ubelaker (2002), and González-Colmenares et al. (2007). The sample used was the Collection of Modern Colombian Skeletal Remains curated by the National Institute of Legal Medicine and Forensic Sciences in Bogotá, Colombia. Both male and female individuals were utilized and age-at-death ranged from 19 – 93 years with a mean age of 47.5 years. Although 133 individuals were examined, only 88 were included in this study, due to either poorly defined root translucency or entirely edentulous individuals.

All data were collected blind to real age and the teeth utilized included maxillary and mandibular incisors and canines which met the requirements of root translucency, level of periodontosis, and root length. The usable dental structures were cleaned with a 0.05% sodium hypochlorite solution for 60 seconds, dried with gauze, analyzed on a light box with electronic caliper, and finally packaged in plastic bags, labeled, and filed with the case file. A subset of the original sample was measured twice by each author so that intra and inter-observer could be assessed.

Correlation coefficients were calculated for root translucency, periodontosis, and root height and age-at-death was calculated with each method. Not surprisingly, root translucency and periodontosis were significantly correlated with age (r_s = 0.515 and 0.612, respectively; $p < 0.001$) but root height was not (r_s = -0.025; p = 0.820). Such results mirror those of González-Colmenares et al. (2007) who also found that root height did not increase with age.

The mean difference between real age and estimated age were as follows: Lamendin (+0.25 years, standard deviation 15.01 years), González-Colmenares et al. (+0.17 years, standard deviation 14.84 years) and Prince and Ubelaker (+3.52 years, standard deviation 13.82 years). Simple scatterplots which plotted estimated age against real age generated the following R^2 coefficients: Lamendin (0.406), González-Colmenares et al. (0.413), and Prince and Ubelaker (0.532). Moreover, overall results fit a consistent pattern of over-aging young adults and under-aging old adults. These results indicate that dental estimation methods may inform overall age-at-death estimates, particularly in younger adults, and that population-specific standards should continue to be developed for Colombia.

Dental Age Estimation, Colombian Population Standards, Teeth

