H100 Skeletal Maturation of the Medial Clavicle and First Sacral Segment in Modern Colombians

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The goal of this presentation is to provide important information about skeletal maturation in modern Colombians as a first step in addressing the dearth of research in this area. This project is part of a larger collaboration aimed at providing Colombian forensic practitioners with population-specific standards for establishing a biological profile from skeletal remains.

This presentation will impact the forensic science community by demonstrating ages-at-transition for the medial clavicle and first sacral segment in modern Colombians. This information can be immediately applied in Colombia as one tool for young adult age estimation.

In the last two decades, the field of forensic sciences in Colombia has implemented important age estimation methods, including standards that have not been fully validated for the Colombian population. The purpose of the this paper is to present preliminary results of ongoing research on age estimation of young adults, specifically focusing on the medial clavicle and first sacral segment. These two skeletal maturation indicators are particularly useful in forensic contexts, as they are highly diagnostic for age estimation in the 20-30 year old range, which comprises a large portion of forensic case work in Colombia.

The skeletal sample for this study is a subset of the Colombian Modern Skeletal Collection from the Institute of Legal Medicine and Forensic Sciences in Bogotá, Colombia (39 individuals aged 19 to 33 years). The mean age of the sample is 25 years, and 80% of the sample is comprised of males. Whereas it is important to analyze male and female fusion separately because females are typically precocious in skeletal maturation, the small sample size in this preliminary investigation does not permit a statistically sound analysis of the female sample (n=9). Consequently, the sample was analyzed in two ways: as a combined sample, and males only. Each author independently scored the two age indicators in order to facilitate inter-observer error analyzes. The epiphyses were scored as unfused, fusing, or fused. Transition analysis, or probit regression, was performed using the cumulative probit option in NPHASES2 in order to determine the average age of the transition from one fusion stage to the next.

The combined and male-only analyses did not yield significantly different results, likely on account of the small female sample size. For the medial clavicular epiphysis, males transition from unfused to fusing at 20 years and from fusing to fused at 27 years. The combined sample gave similar results: the transition from unfused to fusing was 20 years, and the transition from fusing to fused was 26 years. These results differ from those obtained by Langley-Shirley and Jantz (2010) on a modern American sample with respect to the first transition (modern American males transition from unfused to fusing at 16 years), but not with respect to the second transition. This difference in the first transition is more likely a result of the sample age distribution of the Colombian sample than actual differences in age-at-transition. Consequently, American standards may be appropriate for the Colombian population, but further investigation is necessary to ascertain this for certain.

Transition ages of the first sacral segment were similar to those of the medial clavicle. Males transition from unfused to fusing at 20 years and from fusing to fused at 27 years. The combined sample also transitioned from unfused to fusing at 20 years and from fusing to fused at 29 years.

This presentation will discuss the implications of these results to forensic practice in Colombia and evaluate epiphyseal union in the Colombian population compared to other modern populations, taking into consideration the country's political history and general socioeconomic status. More importantly, the humanitarian impact of this project will contribute to the search for the truth and the protection of the most vulnerable sectors of a population exposed to the rigors of ongoing conflict.

Reference:

[1.] Langley-Shirley N, Jantz RL. A Bayesian approach to age estimation in modern Americans from the clavicle. J Forensic Sci 2010;55(3):571-83.

Epiphyseal Fusion, Age Estimation, Transition Analysis

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