H47   The Potential for Sex Assessment From Dental Dimensions in Modern Forensic Cases

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The goal of this presentation is to examine the degree of sexual dimorphism in tooth dimensions and to explore the utility of these measurements in the assessment of sex.

This presentation will impact the forensic science community by investigating the potential of a method of sex assessment that could be used in cases where other indicators of sex are absent or ambiguous.

One of the most crucial steps in constructing the biological profile of an unknown individual is the assessment of biological sex from skeletal remains. Estimation of other aspects of the biological profile often relies on a prior knowledge of an individual's sex. However, in many forensic cases, the most diagnostic elements for sex estimation may not be present, have been damaged, or provide ambiguous results. Additionally, morphological and metric methods for sex assessment in subadult skeletal remains have not been reliably established; however, the permanent dentition has been used to accurately sex subadults with mixed dentition. Since 1972 at the C.A. Pound Human Identification Laboratory, approximately 20% of cases involved examination of either subadult remains or the skull/cranium or mandible as the only element available for sex assessment. In cases such as these, other means for assessment of sex from skeletal remains need to be investigated.

Human dentition is highly controlled by genetics and is the most durable portion of the human skeleton. Previous studies have shown that the adult dentition is sexually dimorphic, with sex prediction accuracies ranging from 62.3% to 85%. However, many of these studies are restricted primarily to archaeological populations or casts from living individuals. In forensic cases, odontometrics may prove a feasible option for sex assessment when remains are fragmentary, ambiguous, or a subadult with mixed dentition.

The current study examines the potential utility of odontometrics for sex assessment in a contemporary European American sample of forensic cases analyzed and curated at the C.A. Pound Human Identification Laboratory. Digital extended pointed jaw calipers were used to measure the mesiodistal and buccolingual diameters of the permanent dentition of 33 males and 20 females (total n=53). Measurements were not taken in dentition where attrition, carious lesions, restorations, or dental crowding prevented an accurate measurement. Due to these conditions, as well as antemortem and postmortem tooth loss, not all teeth are equally represented within the sample; however, this reflects actual conditions of remains in forensic casework. Student's t-tests were used to determine which dimensions were statistically different between the sexes, and sectioning points were calculated from these dimensions. Measurements higher than the sectioning point are classified as male, and those smaller than the sectioning point are classified as female.

Paired t-tests revealed statistically significant differences between the sexes (at a 0.05 alpha-level) in seven buccolingual dimensions: LI^2, LC', LP^4, LI_2, LC', LM_1, and RC_1 and four mesiodistal dimensions: LC^1, LP^4, RM^1, and LC_1. Sectioning points were established using a weighted mean for each of these teeth. Additionally, a discriminate function analysis was performed using those teeth that exhibited statistically significant differences in size between the sexes. Within this subset of the dentition, the combined buccolingual dimensions of LI^2 and LC^1 provide the highest accuracy levels at 77% for cross-validated correct classification of both males and females within the sample. Interestingly, the buccolingual dimensions are often easier to take than the mesiodistal measurements, particularly in modern populations, which exhibit significant dental crowding.

The correct classification of 77% falls within the range of accuracy levels of previous sexual dimorphism studies from the dentition. However, due to the established population specificity of sexual dimorphism in teeth, these results may not be applicable to non-European ancestral groups. Regardless, this study suggests that dental dimensions may provide additional information that should be considered in the assessment of sex, and may greatly aid in the analysis of fragmentary, incomplete, or subadult remains.

Sex Assessment, Odontometrics, Forensic Anthropology