

G41 The Estimation of Sex From Dental Arch Dimensions: An Odontometric Analysis

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Learning Overview: The goal of this presentation is to educate attendees concerning the applicability of dental arch dimensions in sex estimation.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by allowing attendees to estimate sex from dental arch dimensions in the absence or extreme decimation of more reliable parameters or in association with other criteria.

Identification process is the backbone of crime investigation. Lack of sophisticated facilities such as DNA profiling in the developing countries make anthropometric and odontometric techniques a popular and useful choice for identification among the experts.

Estimation of sex is a part of the identification process and is an essential investigation in medicolegal examinations, especially those involving dismembered and skeletal remains. Principle determination of sex is based on well-established size differences between males and females. These differences are dependent on a variety of factors, such as genetics, environmental influences, etc. Traditional methods of determination of sex include observation of differences in morphological features of males and females. Most of these differences are somewhat subjective and are not measurable. However, owing to the reliable results derived in the research involving metric analysis, experts rely more on the methods which involve measurements.

Teeth are one of the most durable and well-protected parts of the human body that resist decay and destruction even in cases of extensive fire and can be used to determine the sex of an individual. Though a lot of research has been conducted on correlation of sex and tooth size, not much emphasis has been given to the use of dental arch dimensions for estimating sex. Even among the few studies that have conducted some research using dental arch dimensions, focus has been singularly on the inter-canine distance and not the distances between the premolars and molars, which are more likely to be found intact in decomposed and skeletonized remains. Also, the majority of such studies have been conducted only on the mandible. Measurements of maxillary arches assume importance, considering that the mandible may not always be recovered in extreme decay and dismemberment, and when only skull is brought for examination.

This present study was conducted to analyze the differences between males and females based on all the dental arch dimensions of both of the jaws in an Indian population. The dental arch dimensions of the canines, premolars, and the molars of both the jaws were recorded in dental casts of 307 participants. Comparison of the dental arch dimensions of males and females was performed and logistic regression models were generated to estimate sex. Receiver Operator Curve (ROC) analysis was performed to find out the potential to estimate sex for all the dental arch dimensions in both sexes. It was observed that maxillary inter-molar II distance gave the best results in estimating the sex. The sexing accuracy is seen to increase as one goes distally from canines to molars in each jaw; minimum for inter-canine distance and maximum for distance between the 2nd molars. The development of models for estimation of sex from dental arch dimensions will enable sexing in cases of dismembered skeletal remains too.

Dental Arch Dimensions, Sex Estimation, Forensic Odontometry