



F26 Sex Determination Using Mesio-Distal Dimension of Permanent Maxillary Incisors and Canines in a Modern Chilean Population

Tanya R. Peckmann, PhD, Saint Mary's University, Dept of Anthropology, MS217, 923 Robie Street, Halifax, NS B3H 3C3, CANADA; Ciara Logar, BSc, Saint Mary's University, 923 Robie Street, Halifax, NS B3H 3C3, CANADA; Claudia E. Garrido-Varas, PhD, Borough Road, School of Science & Engineering, Middlesbrough, Cleveland TS1 3BA, UNITED KINGDOM; Susan B. Meek, PhD, Saint Mary's University, Biology Dept, 923 Robie Street, Halifax, NS B3H 3C3, CANADA; Paul Miller, DDS, Saint Mary's University 923 Robie Street, Halifax, NS B3H 3C3, CANADA; and Ximena Toledo, DDS, University of Chile, School of Dentistry, Sergio Livingstone 943, Independencia, CHILE*

After attending this presentation, attendees will: (1) understand that dental methods developed on a Northern Indian population are not accurate for determining sex for Chilean populations; (2) learn how to apply discriminant function equations for determining sex from human remains; and, (3) learn how to test discriminant functions developed on a Northern Indian population and apply them to a Chilean population.

This presentation will impact the forensic science community by: (1) providing unique research which has not been published previously for a Chilean population; (2) presenting data which shows that methods employed for determining sex from dentition must be developed on the population to which they will be applied, i.e., dental methods developed on a Northern Indian population are not accurate for determining sex for a Chilean population; and, (3) showing how a sexing method derived from dental measurements can be applied in subadult individuals ages 13 – 17 years. There are few studies that have focused on this age group, as the crown of the permanent incisors and canines develop at an early age. Methods derived from them will have a great impact on the study of juvenile skeletal remains.

After attending this presentation, attendees will understand the potential value of using the mesio-distal dimension of permanent maxillary incisors and canines to estimate the sex of unknown individuals. Because of the postmortem preservation and the fact that crown development is completed before puberty, teeth can be used to estimate the sex of pubescent individuals as well as in adults when other sex diagnostic elements of the skeleton are absent or badly preserved.

The purpose of this study was to determine if sexual dimorphism is present in the maxillary central and lateral incisors and maxillary canines of a modern Chilean population. A total of 205 molds (128 males and 177 females) were selected from the Departamento de Investigación del Instituto Nacional de Ortodoncia in Santiago, Chile, ranging from 13 to 33 years of age. Inclusion criteria consisted of individuals older than 13 years, presence of all six teeth, absence of caries, restorations, and crowding on the examined teeth. Patients exhibiting dento-maxillary anomalies such as cleft palate, shape and size teeth anomalies, and/or craniofacial syndromes were excluded from the sample. The maximum mesio-distal dimension was recorded for each of the six teeth investigated, measurements were taken from the vestibular aspect of the teeth, parallel to the occlusal plane, measuring the maximum dimension using a digital Vernier caliper accurate to 0.01mm.

The data was then subjected to statistical analysis; the mean, range, and standard deviation were calculated for each tooth, two-sample *t*-test was used to test for the statistical difference between means, and, therefore, to determine the presence or absence of sexual dimorphism. Pearson's correlation coefficient, *r*, was calculated to measure the effect size of the relationship between mesio-distal dimensions and sex. Canonical discriminant function coefficients were used to develop formulas to estimate sex from the teeth that exhibited sexual dimorphism.

The results of this investigation showed that although the mean measurements of the teeth were all greater in the male population, only statistically significant sexual dimorphism was present in both central incisors and canines, both left and right side. Pearson's correlation coefficient showed a medium effect size ($r = 3.7$) on the canines, whereas the central incisors only showed a small effect size ($r \leq 2.6$). Minimum values of 7.17mm and 7.33mm for the right and left canines and of 7.42mm and 7.45mm for the right and left central incisors were recorded on the male group. Maximum values of 9.2mm and 9.65mm for the right and left canines, and of 10.1mm and 10.55mm were recorded on the female group.

When examining the classification results to assess which tooth more accurately estimated sex, the right canine performed better with 78.5% correct female identification and 49.2% correct male identification. The left central incisor had the highest correct classification percentage for females (84.2%) but also had the lowest percentage for males (29.7%). The low correct classification for the males could be explained despite the significant values ($p \leq 0.001$) for sexual dimorphism – due to a major overlap of measurements between the sex groups, which is concordant with the effect size (Pearson's correlation coefficients)



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reported. Nevertheless, when using the minimum dimensions of the canines found on men, 8% of the female sample could be correctly classified.

This research has shown that sexual dimorphism is present on the maxillary canines and central incisors but that the formulas derived from the mesio-distal measurements are of limited use because of the low correct classification of males. No previous research on teeth dimensions has been done on the Chilean population with the purpose of estimating sex. This study has contributed to the characterization of this population and could help in correctly identifying the sex in a small percentage of cases involving unknown individuals.

Dentition, Chilean Population, Sex Determination