

Accepted Manuscript

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PII: S0379-0738(18)30361-X
DOI: <https://doi.org/10.1016/j.forsciint.2018.06.036>
Reference: FSI 9383

To appear in: *FSI*

Received date: 8-5-2018
Revised date: 19-6-2018
Accepted date: 26-6-2018

Please cite this article as: Sandra Loépez-Laézaro, Inmaculada Alemaén, Joan Viciano, Javier Irurita, Miguel C. Botella, Sexual Dimorphism of the First Deciduous Molar: A Geometric Morphometric Approach, Forensic Science International <https://doi.org/10.1016/j.forsciint.2018.06.036>

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Sexual Dimorphism of the First Deciduous Molar: A Geometric Morphometric Approach

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HIGHLIGHTS

- Intra- and interobserver error analysis shows excellent reliability.
- The first maxillary deciduous molar showed a significant sexual dimorphism.
- The size variable increased the discriminatory power for the maxillary molar.

ABSTRACT

Estimating the sex of immature skeletal remains is important when reconstructing the biological profile of unknown individuals in anthropological practice. Teeth have a distinct importance as they are the most frequently recovered physical elements of an individual. They persist after death due to their hardness and resistance to postmortem insults. The aim of this study was to analyse the sexual dimorphism of the occlusal surface of the first deciduous molar using geometric morphometric techniques. This study evaluated 38 first maxillary deciduous molars (21 males, 17 females) and 30 first mandibular deciduous molars (15 males, 15 females) from the Granada osteological collection of identified subadults (Granada, Spain). The landmark and semilandmark coordinates were analysed by principal components analysis, canonical variate analysis and discriminant analysis. Only the first maxillary deciduous molar showed a significant sexual dimorphism, with cross-validation values for shape variables of 93.23% for males and 83.17% for females, and 100% for males and 87.50% for females when both shape and size variables were considered. Despite there being acceptable cross-validation classification for the first mandibular deciduous molar (82.35% for males and 92.31% for females for shape variables and 82.35% for males and 92.31% for females for shape and size variables), no significant differences indicating sexual dimorphism were identified. The results show that the first upper deciduous molar can assist in sex estimation, and that geometric morphometric analysis is a suitable technique to answer questions related to shape that cannot be observed with the naked eye.

Keywords

Sex estimation; Deciduous dentition; Landmarks; Semilandmarks; Cross-validation

INTRODUCTION

Sex estimation is a key step during physical and forensic anthropological analyses [1,2]. Due to the importance of accurately estimating sex, a large number of studies have identified the most sexually dimorphic traits of the human skeleton [3]. When estimating sex, there are two anatomical regions of the adult skeleton that are considered reliable, the skull and the pelvis [4]. However, for immature human remains, the absence of sexually dimorphic characteristics in the human skeleton makes it difficult to estimate sex [5]. In addition, there are limited skeletal samples of known sex and of equally distributed ages throughout non-adult periods [6]. This paucity of data can be partially attributed to cultural factors and poor preservation of smaller, more fragile bones [7].

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