Article

Forensic Gender Determination by Using Mandibular Morphometric Indices an Iranian Population: A Panoramic Radiographic Cross-Sectional Study

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Abstract: Gender determination is the first step in forensic identification, followed by age and height determination, which are both affected by gender. This study assessed the accuracy of gender estimation using mandibular morphometric indices on panoramic radiographs of an Iranian population. This retrospective study evaluated 290 panoramic radiographs (145 males and 145 females). The maximum and minimum ramus width, coronoid height, condylar height, antegonial angle, antegonial depth, gonial angle, and the superior border of mental foramen were bilaterally measured as well as bicondylar and bigonial breadths using Scanora Lite. Correlation of parameters with gender was analyzed by univariate, multiple, and best models. All indices except for gonial angle were significantly different between males and females and can be used for gender determination according to univariate model. Condylar height, coronoid height, and superior border of mental foramen and ramus were still significantly greater in males than in females after controlling for the effect of confounders ($p < 0.05$). Based on the best model, a formula including five indices of bicondylar breadth, condylar height, coronoid height, minimum ramus width, and superior border of mental foramen was used for gender determination. Values higher than 56% indicate male gender, while lower values indicate female gender, with 81.38% specificity for correct detection of females and 88.97% sensitivity for correct detection of males. Despite the satisfactory results, future research should focus on larger populations to verify the accuracy of the present findings.

Keywords: mandible; radiography; panoramic; gender determination; forensic anthropology

1. Introduction

In accidents and disasters with a high number of fatalities, identification of victims is highly important. This process would be simple and could be done with 100% certainty if the bodies are intact [1,2]. However, in accidents and disasters such as a plane crash, flood, or earthquake, the bodies may be severely damaged, making their identification almost impossible. Forensic gender determination is the first step in such cases, followed by age determination and height determination, which are both affected by gender [3]. Accurate forensic identification depends on the presence of intact remains; in that case, correct identification can be done with up to 95% certainty [4–6].