Journal of Advanced Medical and Dental Sciences Research
@Society of Scientific Research and Studies ***NLM ID:*** *101716117*

Journal home page: www.jamdsr.com doi: 10.21276/jamdsr Indian Citation Index (ICI) Index Copernicus value = 100

(e) ISSN Online: 2321-9599; (p) ISSN Print: 2348-6805

Original Research

Assessment of correlation of anthropometric measurements and odontometric measurements in stature estimation

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ABSTRACT:
Background: Stature estimation is a preliminary examination in the identification of unidentified human remains. The present study was conducted to assess correlation of anthropometric measurements and odontometric measurements in stature estimation. **Materials & Methods:** 80 patients of both genders were enrolled. Measurements of mesiodistal widths of the six maxillary anterior teeth, circumference of the skull, and height were made directly on each patient. Anteroposterior diameter of the skull was obtained on the lateral cephalogram. **Results:** In males and females, mean combined mesiodistal width of maxillary anterior teeth was 48.6 cm and in females was 47.1 cm. The mean head circumference was 546.8 cm and 508.2 cm in males and females respectively. The mean skull diameter was 178.4 cm in males and 164.2 cm in females. The mean height was 1716.2 cm in males and 1580.4 cm in females. The difference was significant (P< 0.05). In males and females, ratio of head circumference to combined mesiodistal width of maxillary anterior teeth was 11.8 and 10.4, skull diameter to combined mesiodistal width of maxillary anterior teeth was 3.64 and 3.96, height to combined mesiodistal width of maxillary anterior teeth was 35.9 and 33.2, head circumference to skull diameter was 3.17 and 3.08, height to head circumference was 3.16 and 3.08, and height to skull diameter was 9.86 and 9.41 respectively. The difference was significant (P< 0.05). **Conclusion:** Anthropometric and odontometric measurements correlate with each other for stature estimation.
Keywords: maxillary anterior teeth, skull, odontometric

Received date: 19 February, 2024 Acceptance date: 22 March, 2024

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This article may be cited as: Gadhiya R, Vyas T. Assessment of correlation of anthropometric measurements and odontometric measurements in stature estimation. J Adv Med Dent Scie Res 2024;12(4):29-31.

INTRODUCTION

The use of forensic dentistry is crucial for human identification, particularly in cases where traditional techniques are impractical owing to extensive body fragmentation, carbonization, or decomposition. Face recognition software can be difficult or impossible to utilize in severe trauma and fire accidents or natural catastrophes where fingerprints are not available. In these situations, a forensic dentist creates a post-mortem record in which the victim's age, stature, ancestry, sex, and socioeconomic class are determined. The victim's body has been disfigured, and the head or extremities have been removed from the trunk. A person's stature is their height when they are standing straight. Stature estimation is a preliminary examination in the identification of unidentified human remains. The most popular method for estimating stature when identifying someone based solely on skeletal remains is to use long bones. These are predicated on the idea that stature and the numerous long bones positively connect. Stature correlation to skull and jaw dimensions is frequently reported among various populations. Correlations between anthropometric and odontometric measurements may vary among different populations due to genetic, environmental, and cultural factors. Therefore, equations developed for one population may not be directly applicable to another. Stature estimation based on dental measurements may be more accurate in adults than in children or adolescents due to ongoing dental development and growth. Age-related changes in dental dimensions need to be considered when estimating stature. There are often significant differences in anthropometric measurements between males and females, as well as differences in dental

dimensions. Equations for stature estimation based on dental measurements may need to be sex-specific to improve accuracy. The present study was conducted to assess correlation of anthropometric measurements and odontometric measurements in stature estimation.

MATERIALS & METHODS

The present study consisted of 80 patients of both genders. All gave their written consent to participate in the study. Data such as name, age, gender etc. was recorded. Measurements of mesiodistal widths of the six maxillary anterior teeth, circumference of the skull, and height were made directly on each patient. Anteroposterior diameter of the skull was obtained on the lateral cephalogram. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

RESULTS

Table: I Assessment of parameters

Parameters	Male	Female	P value
Combined mesiodistal width of maxillary anterior teeth	48.6	47.1	0.94
Head circumference	546.8	508.2	0.02
Skull diameter	178.4	164.2	0.04
Height	1716.2	1580.4	0.01

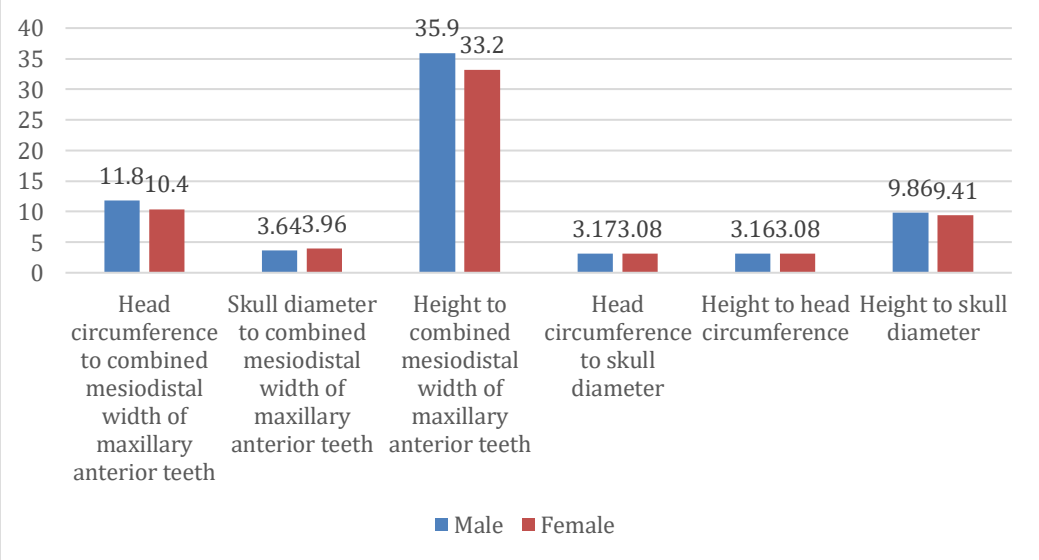
Table I shows that in males and females, mean combined mesiodistal width of maxillary anterior teeth was 48.6 cm and in females was 47.1 cm. The mean head circumference was 546.8 cm and 508.2 cm in males and females respectively. The mean skull diameter was 178.4 cm in males and 164.2 cm in females. The mean height was 1716.2 cm in males and 1580.4 cm in females. The difference was significant (P< 0.05).

Table: II Descriptive statistics for the ratios studied

Parameters	Male	Female	P value
Head circumference to combined mesiodistal width of maxillary anterior teeth	11.8	10.4	0.03
Skull diameter to combined mesiodistal width of maxillary anterior teeth	3.64	3.96	0.05
Height to combined mesiodistal width of maxillary anterior teeth	35.9	33.2	0.01
Head circumference to skull diameter	3.17	3.08	0.04
Height to head circumference	3.16	3.08	0.86
Height to skull diameter	9.86	9.41	0.03

Table II, graph I shows that in males and females, ratio of head circumference to combined mesiodistal width of maxillary anterior teeth was 11.8 and 10.4, skull diameter to combined mesiodistal width of maxillary anterior teeth was 3.64 and 3.96, height to combined mesiodistal width of maxillary anterior teeth was 35.9 and 33.2, head circumference to skull diameter was 3.17 and 3.08, height to head circumference was 3.16 and 3.08, and height to skull diameter was 9.86 and 9.41 respectively. The difference was significant (P< 0.05).

Graph: I Descriptive statistics for the ratios studied



DISCUSSION

Different techniques are employed to determine the identify of missing human remains. Every method's level of reliability differs. Physical anthropology has a long history of using stature estimation as a tool for identification. The restricted applicability of these

approaches to fragmentary remains is a limitation. It is typical practice to amputate the head or extremities from the trunk after a body has been mutilated. The estimated association between the remains and stature must then be considered. Osteometry appears to be the method of choice since it is somewhat more accurate in identifying racial and sexual identity. Due to the standardization, clarity, and ease of location of the anatomical landmarks, the method of measuring teeth and skulls has various advantages. Based on the idea that long bones positively correlate with stature, living stature can be estimated from them. Given this, even though they might not correspond as strongly, some portions of each bone should likewise be associated to stature. The present study was conducted to assess correlation of anthropometric measurements and odontometric measurements in stature estimation. We found that in males and females, mean combined mesiodistal width of maxillary anterior teeth was 48.6 cm and in females was 47.1 cm. The mean head circumference was 546.8 cm and 508.2 cm in males and females respectively. The mean skull diameter was 178.4 cm in males and 164.2 cm in females. The mean height was 1716.2 cm in males and 1580.4 cm in females. Kalia et al investigated the possibility of estimating height from odontometry and anthropometric data of the skull for the positive identification of height in forensic investigations concerned with fragmentary human remains. Significant sexual dimorphism was observed for the parameters studied ($P < 0.05$). Highly significant correlation was found between height and other parameters when combined data and data for males were regressed. The equation relating height to the combined mesiodistal width of maxillary anterior teeth was derived as height = 982.421 + 13.65 x combined mesiodistal width of maxillary anterior teeth ($P < 0.0001$). Similarly, equations were obtained by regressing height to head circumference and skull diameter ($P < 0.0001$ for both). We found that in males and females, ratio of head circumference to combined mesiodistal width of maxillary anterior teeth was 11.8 and 10.4, skull diameter to combined mesiodistal width of maxillary anterior teeth was 3.64 and 3.96, height to combined mesiodistal width of maxillary anterior teeth was 35.9 and 33.2, head circumference to skull diameter was 3.17 and 3.08, height to head circumference was 3.16 and 3.08, and height to skull diameter was 9.86 and 9.41 respectively. Gupta et al correlated height and gender from odontometry and anthropometric data of the skull. On linear regression analysis, the selected parameters were found to be statistically significant predictor of height. It was also established by Karl Pearson's coefficient correlation that the left mandibular canine index for female was statistically significant to show sexual dimorphism.

The limitation of the study is the small sample size.

CONCLUSION

Authors found that anthropometric and odontometric measurements correlate with each other for stature estimation.

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