ORIGINAL ARTICLE

Stature estimation using the odontometric measurements of the maxilla

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ABSTRACT

Stature is the height of an individual in an upright position. It is one of the key characteristics, which helps in defining any individual. Stature estimation is needed mostly in medicolegal cases where only a limited number of human fragments are left for forensic analysis. The teeth provide essential measurements that can be used to determine stature. The aim of the study is to find out whether the second maxillary interpremolar distance can be used to effectively estimate stature of individuals. For the study, the sample size taken was 60 (30 male and 30 females), and their second maxillary interpremolar distance was measured using a digital vernier caliper. The collected data were tabulated and statistical analysis was done using SPSS software (23), followed by linear regression. For male: Y = 178.65 − 1.09X, correlation coefficient, r = 0.05, For female: Y = 169.30 − 1.99X, correlation coefficient, r = 0.13. Since $r < 0.2$, there is no correlation between the interpremolar distance of the second maxillary premolar and the stature. From our study, we conclude that the interpremolar distance of the second maxillary premolar cannot be a reliable parameter for stature estimation in both genders.

Key words: Height, innovative forensic studies, interpremolar distance, odontometric measurements, stature estimation

INTRODUCTION

Stature refers to the height of a person when standing in an erect posture.[1] Height of a person, without any doubt, can be considered as one of the key characteristics, which helps in defining the particular person. It is predominantly population dependent as the average height of an individual will vary from place to place and from one socio economic class to another.[2,3] Stature is commonly estimated using the different long bones of the body, such as tibia, femur, and humerus. This stature correlation occurs as several long bones of the body have positive correlation with the person's height.[4] Development of the long bones of the body and the height attained by an individual at adulthood are largely dependent on the environment, work, food habits, and lifestyle that the individual leads.[3,5,6]

Stature estimation comes in extensive use and needs in a majority of medicolegal cases.[5] These refer to cases where only a limited amount of skeletal remains are available for forensic analysis such as cases of incineration or severe accidents that end up resulting in the loss of major parts of the body, limbs, and spine.[7,8] Teeth fragments being made out of mostly hard tissues and owing to their chemically inert properties and physically indestructible nature under

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normal circumstances, have the added advantage of being particularly helpful in estimating someone's stature.[1,7] This method of estimating stature by taking various parameters of the teeth is referred to as odontometric analysis. Research has been previously done on stature estimation using the odontometric parameters by previous authors,[1,7,9] who took parameters such as the anterior teeth width, the crown length of canines, the intercanine distance on both mandible and maxilla and the root length of the incisors, and the cusp lengths of the posterior teeth. Odontometric measurements for the second maxillary premolars have not been previously taken for stature estimation in any previous research.

The extensive knowledge and experience of our research team have been translated into high-quality publications.[10-29] The present study was done to find whether the second maxillary interpremolar distance can be used to effectively estimate stature of individual.

MATERIALS AND METHODS

The study population was dental students from Saveetha Dental College and Hospital, Chennai. The total sample size was taken to be 60, out of which 30 were males and 30 were females. This study was approved by Scientific Review Board of Saveetha Dental College (IHEC/SDC/ANAT/21/216). A digital vernier caliper with accurate adjustments was used as a measurement instrument of choice to take the second interpremolar distance of the maxilla, directly from the subjects, with prior consent. The distance was taken by inserting the vernier caliper into the oral cavity of the subjects and measuring the distance in-between the buccal surfaces of both sides' maxillary second premolars (15,25). The height was measured with the measuring rod placed on a wall with the subject standing upright and barefoot with their heels against the wall. The measurements were tabulated, and a linear regression equation was estimated using IBM SPSS Statistics (Version 23).

RESULTS

From the data in table 1, regression equation was obtained using the formula Y = A + Bx,

Table 1: Values of various measurement obtained in study

	Male	Female
n	30	30
Mean of maxillary second interpremolar width (X) (cm)	4.89	4.5
Mean of height (Y) (cm)	173.3	172.8
Correlation coefficient	0.054	0.13
A	178.65	169.3
B	−1.09	−1.99

For male: Y = 178.65 − 1.09X, correlation coefficient, $r = 0.05$.

For female: Y = 169.30 − 1.99X, correlation coefficient, $r = 0.13$.

Since $r < 0.2$, odontometric measurement of the maxillary second interpremolar distance is not a reliable parameter for stature estimation in both genders.

DISCUSSION

From this study, it was found that the interpremolar distance of the second premolar of the maxilla is not a reliable parameter and thus cannot be used to determine the stature of an individual. Previous research by Kalia *et al*. used the maxillary anterior teeth mesiodistal width to determine the height of a person.[30] Hossain *et al*. found that the intercanine distance of the maxilla can also be successfully used for height estimation of a person.[31] Research done by Khangura *et al*. found that the mesiodistal crown width of the posterior teeth can be used to estimate stature.[1] Sunitha *et al*. found that incisor height can also be taken to estimate stature of an individual.[32] Stature has also been estimated successfully by Saco-Ledo *et al*. using tibia lengths of different individuals.[33] Asadujjaman *et al*. used the foot length as a parameter to estimate the stature of their study population.[8] The combined length of the sternum was used to estimate stature by Saraf *et al*.[34] Furthermore, pelvic dimensions and femoral length were also used by Imai *et al*. to find a strong correlation with stature.[35]

Limitation

The sample size was very small; as a result, correlation was not found and the data were statistically insignificant.

Future scope

We are planning to increase the sample size and measure among different age groups and race.

CONCLUSION

Odontometric measurements of the teeth in both maxilla and mandible have been previously used to determine stature and gender. From the obtained results, it was found that the second maxillary premolar is not a reliable parameter for estimating stature of an individual.

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Conflicts of interest

There are no conflicts of interest.

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