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A RESEARCH STUDY ON APPLICABILITY OF ODONTOMETRIC PARAMETERS IN ANTHROPOMETRY ON NORTH INDIAN POPULATION

Forensic Medicine

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ABSTRACT

The aim of the present study was to investigate any possible relation between stature of an individual and different dental measurements.

Materials and Methods: Three parameters of odontometry were studied on 90 subjects, namely- intercanine width (ICW), interpremolar width (IPW), mesiodistal dimension of six permanent maxillary anterior teeth (SUM).

Results: A highly significant correlation was noted between both ICW and stature, and between stature and the summative mesiodistal dimension of six permanent maxillary anterior teeth . There was no significant correlation between IPW and height .

Conclusion: The current study successfully concludes that both ICW and mesiodistal dimension of six permanent maxillary anterior are good predictors of height of an individual, thus supplementing other methods of identification.

KEYWORDS

odontometric parameters, anthropology, stature estimation

INTRODUCTION:

Dental identification, like dactylography, has always been considered as a dependable method for comparative identification, given that teeth are impervious to fire, decomposition and mechanical injury. Even as more sophisticated methods for identification have evolved in recent times, yet, forensic odontology continues to hold an important place in extensively putrefied autopsy cases , in mutilated bodies or in fragmented body remains. Height of an individual and stature are interchangeably used terms. It is an important parameter in anthropometry. Long bones are the preferred modality for calculation of height of an individual. However, there is a established proportional consociation in literature, between various segments of body including head and face, long bones, spine, digits and stature [1-24].

AIM OF THE STUDY:

The current study considers three odontometric parameters - intercanine width, interpremolar width and combined mesiodistal width of six permanent maxillary anterior teeth. The possibility of correlation between the above mentioned odontometric parameters and height of an individual has been explored in the present study.

MATERIALS AND METHODS:

- 90 subjects (45 male and 45 female) were studied. The age group ranged from 18-25 years . The study was conducted in the Department of Forensic Medicine & Toxicology, HIMS, Varanasi.
- **Inclusion criteria:** The teeth of all the subjects were clinically assessed. Only those subjects who had a aligned, set of completely erupted, visibly healthy and did not show evidence of carious teeth were included in the study.
- **Exclusion criteria:** Subjects having unhealthy, carious, malaligned teeth, past history of medical or dental intervention, endocrinal, metabolic disorder or dental or jaw trauma were excluded.
- Consent was obtained from the participants in writing after duly explaining in detail the procedure, risk and benefits.
- The following odontometric parameters were measured using a digital vernier calliper:

1. The intercanine width (IC)- the blades of the vernier calliper are placed such that they extend from the tip of right canine, transversing across to the tip of left canine of upper jaw.
2. The interpremolar width (IP)- it is the transverse distance extending from the tip of right premolar to the tip of left premolar in the maxilla.
3. The mesiodistal distance of the six permanent anterior maxillary teeth- individual measurement of each of the six anterior tooth of the upper jaw was taken and then summed up together [2x central incisor + 2 (right and left) x lateral incisor + 2(right and left) x canine)]

Image 1: The subject was made to sit comfortably upright on a chair and the vernier calliper was placed over the tooth with its blades apart, placed on either edges of the tooth. Summation of all the six anterior teeth of the upper jaw was thus obtained.

Image 2: The blades of the vernier calliper have been placed over the right canine, further extending to the left canine of the upper jaw for determination of ICW.

- Height was calculated using an anthropometer. The subject was made to stand erect against it , barefoot, with head, buttocks and heel in contact with the anthropometer rod. The head was positioned in Frankfurt plane and readings were taken.
- All measurements were repeated thrice and performed by one observer alone, so as to eliminate any error which may be inter or intra observer in nature. The data was collected and correlated using SPSS software package and a linear regression formula obtained.

RESULTS

Table 1 demonstrates the maximum, minimum and mean value, along with the standard deviation for each parameter.

Table 2 elicits the correlation coefficient and p-value. This has been done for each parameter. A highly significant correlation was noted between both ICW and stature, and between stature and the summative mesiodistal dimension of six permanent maxillary anterior teeth . There was no significant correlation between IPW and height .

In Table 3 regression equation is calculated with y as the predicted height, Constant (c), Regression coefficient (m) and parameters of odontometry being value (x). Predicted height was then calculated using the formula, $y = mx + c$.

TABLES:

Table 1: Minimum, maximum, mean values and standard deviation of all the dental measurements studied

Parameter	Minimum	Maximum	Mean	SD
Height	143.4	194.9	161.599	9.8509
SUM	2.89	5.35	4.0479	0.52822
ICW	3.00	4.32	3.4572	0.25974
IPW	3.00	6.99	3.8370	0.46663

Table 2: The correlation coefficient of each of the odontometric parameters and stature along with the corresponding P values

Parameter	CORREL coeff (r)	P value
SUM	0.547	<0.001
ICW	0.412	<0.001
IPW	0.158	NS

Table 3: constant ©, regression coefficient (m), regression formula, p value and significance for the odontometric parameters studied in the current research

Parameter	Constant (c)	Regression coefficent (m)	t value	Regression formula y=c+mx	P value	Significance
SUM	-0.694	0.029	6.134	-0.694+0.029x	<0.001	S
ICW	1.702	0.011	4.242	1.702 +0.011x	<0.001	S
IPW	2.625	0.007	1.504	2.625 +0.007x	>0.01	NS

DISCUSSION

Age, sex and stature are considered to be the cornerstones in identification of an individual.

Thus the anthropologist has time and again used a myriad of measurements on different human bones to come up with a formula to determine height. [1,6-10]. However there is only limited literature exploring the relationship between teeth and stature. Teeth used as an identification tool to be reckoned with. They are an undying, indestructible part of a dead body. Be it fire, maggots or mass casualties, teeth can be used for determination of identity of any fragmented or mutilated remains.

Some studies prove that the sample considered best for odontology studies are the adult permanent teeth of an early age as they have suffered less attrition and festering[25]. Keeping this in mind, the current study focuses on the age group of 18-25 years. Amongst the three odontometric parameters studied in this research, ICW and mesiodistal distance of the six anterior permanent teeth of upper jaw have proved as reliable adjuncts in stature prediction. The above observation is in agreement with studies conducted by Harshala et al[26].ShaliniKalia et al., [23] and RajbirKhangura et al., [27]]. Kalia*et al*. studied only one parameter in his study i.e the summation of width of six anterior teeth of the maxilla and its relationship with height, and even so he found the statistical correlation to be small. RajbirKhangura et al researched on the same odontomteric parameters as considered in the current study for estimation of height and came to the conclusion that the stature of an individual can be positively correlated with the width between the two canines of the upper jaw and the distance between the maxillary premolars of right and left side. Achla Bharti Yadav et al.[28]. hypothesized that the dental measurements are unreliable when used alone for height estimation, however, the maxillary ICW can be utilised as an augmentary tool in estimation of the head to foot length of an individual.

CONCLUSION

As civil right activist Andrew Goodman once said- 'People must have dignity and identity'.

The present research also strives to be an auxillary tool for establishing identity in an unknown unnamed individual using teeth as a modality.

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