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Research Article

Dereviation of Regression Equation for the Estimation of Stature from Cranial Dimensions in Western Rajasthan Populations

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Abstract: The aims of this study is to estimate the height of Adult subject of resident in different districts of Western Rajasthan population from some cephalic Parameters such as head length & head breadth An attempt is also made in present study to find out correlation and to derive a regression formulae between cephalic parameters and stature. The head length and head breadth of a randomly selected sample of 500 subjects whose age range from less than 20 to more than 70 years, were measured directly with a pair of metal spreading calipers and anthropometer. The subject covers a selection of 291 male & 209 female. All measurements were taken by internationally recommended standard methods and techniques. The results show that two parameter correlated positively with stature except head breadth in females. Also, regression analysis showed that the cephalic dimensions gives a better prediction of stature than any other body part measurements and it could be useful in forensic investigations and in Anthropometry.
Keywords: Stature, Cephalic, Head length Head breadth, Correlation, regression.

INTRODCUTION

Establishment of Alternative Methodologies for personal height estimation is essential for a number of reasons, firstly in instances where height estimates needed to be made from fragments of bones in archeological procedures or in forensic science after mass disasters or genocide [1]. Secondly estimates of pharmacokinetic parameters and evaluation status rely on accurate measurement of not only body weight but also on height. In clinical Practice, Population height, and age specific data on cranial dimensions gives an indication of growth and development of an individual and also any abnormalities of cranial size and shape [2]. This is important information for anthropologists and forensic science experts to solve medico legal problems when only mutilated or commingled body parts are available. And it also may facilitate the process of Sex determination.

Although cranial dimensions have been shown to be a reliable means in estimating stature in Italians [5], Japanese [6] and South Africans [7]. All these studies appear to be significant to forensic Science experts, anthropologists, archeologists and demographers. India being a very vast country with diverse population, least, studies on cranial dimensions has been done in Western Rajasthan. Therefore an attempt has been made to carry out to estimate stature from cranial dimensions in Western Rajasthan population.

MATERIALS AND METHODS

The study was conducted on 500 healthy subject age more than 15 years. The subjects were apparently healthy without any craniofacial deformity. They were from different districts of Western Rajasthan population of different socio-economic status. Measurements were taken according to Singh & Bhasin [3]. The stature that is crown heal length, was measured with the help of an anthropometer with the subject standing erect and in anatomical position. Stature was measured to the accuracy of 0.1 cm.

Maximum Head length, which is distance between the glabella and inion, was measured with the help of spreading caliper. Maximum Head breadth, which is the maximum distance between the most lateral points on the partial bones was measured by allowing both tips of spreading caliper to slide down along the lateral aspect of parietal bone until the Maximum width was recorded head length and head breadth was measured using spreading caliper capable of measuring to the nearest 0.01MM.

All the measurements were taken at fixed time to eliminate diurnal variations and by one observer in order to avoid inter observer bias [4].

Range, mean, Standard Deviation and Correlation coefficient, stature, Head length and Head breadth were statistically analyzed. Correlation coefficient and Regression equation for predicting stature from Head dimensions were derived.

RESULTS AND OBSERVATION

Table 1 presents the mean value of the height and cephalic dimension of Western Rajasthan population as follows : height 164.62 cm 166.72 in females and males respectively Head length and Head breadth 17.88 and 13.72 in females, 18.13 and 13.88 in males males shows higher values then females.

Table 2 indicates the correlation coefficients between stature and two cephalic dimensions. The results show that all the cephalic measurements exhibit an significant correlation with stature except head breadth in females.

Table 3 shows regression equation for estimation of stature (in cm) from the cephalic parameters.

Table 4 shows the comparison of work done by various workers with present study.

Table 1: Mean value of stature Head Length & Head Breadth

Trait	Female	Male	P value
Height	164.62±9.60	166.72 ±10.10	<0.01
Head Length	17.88±1.11	18.13 ± 1.01	<0.008
Head Breadth	13.72 ± 0.75	13.88 ± 0.82	< 0.02

Table 2: Correlation Coefficient (r value) of stature and cranial dimensions

Trait	Female (r value)	Male (r value)
Stature with Head length	+ 0.351	+ 0.410
Stature with Head breadth	- 0.028	+ 0.084

Table 3: Regression Analysis for predicting the stature using Head length and Head breadth

Study Group	**Regression Equation**
Females	Stature = 109.63 + 3.075 X HL
	Stature = 169.65 - 0.366 x HB
Males	Stature = 92.726 + 4.080 x HL
	Stature = 152.30 + 1.038 x HB

Table 4: Comparison of Work done by various workers

S. No.	Worker	Year	Correlation Coefficient
1.	Saxena et al [14]	1981	+0.2048
2.	Jadav & Shah[15]	2004	+ 0.53
3.	Krishan K. [9]	2008	0.78
4.	Ilayperuma[16]	2010	0.72
5.	Seema & Mahajan[17]	2011	0.52
6.	Mahesh K & Patnaik[18]	2013	0.174
7.	Present Study	2014	0.394

DISCUSSION

Stature estimation has been considered as one of the parameters of forensic anthropology and will assists in establishing the biological profile of a person [8].Though works concerning estimation of stature from long bones as well as from certain body dimensions have been put forward for some of the Indian population, works concerning estimation of stature from cranial dimensions are scanty.

Hence present study is an attempt to estimate stature from head length and head breadth. And also tried to final out any correlation between stature and Head length & Head breadth. This is study is very unful when only skulls is bought for examination. The findings in the present study (Table-2) indicate that Head length and Head breadth are positively and significantly correlated with stature similar observations on stature have been reported in other races [9]. Stature Head length and head breadth were significantly greater in males when compared with females which is in occurrence with other studies [10-12]. An association of 'Y' chromosome with stature has been documented.

In addition, age of puberty being two years later in male as compared with females give them extra time for growth. This suggests that the formula for one

sex cannot be applied to estimate stature for the other sex [13].

CONCLUSION

The estimation of stature from incomplete & decomposed cranial remains is essential in establishing the identity of unknown subject. Therefore the formulae based on cranial dimensions can help to stature estimation under such circumstances. If one of the parameter is known the other can be known by applying the regression equations and this is of paramount importance to the forensic and anthropology science.

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