Original Research Article

Reconstruction of Body Height Using Right Hand-Palm Length and Middle Finger Length among Sangli District Population

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ABSTRACT

Estimation of stature is significant and unique feature in personal identification in events of natural disasters, murders, accidents. With increasing frequency of mass disasters like floods in Sangali district, therefore these methods will be more helpful and useful for identification of individual. To finds out the correlation between right hand-length of palm and middle finger with body height (stature). The cross-sectional study was with 100 subjects in the age group of 18-20 years native of Sangali district. The study was conducted after taking institutional ethical clearance. This study shows the positive significant correlation is found between the right-hand palm lengths, right hand middle finger with body height. But the middle digit finger is strongly positive than palm length

Keywords: Estimation of stature, Reconstruction of Body Height, Right Hand-Palm Length, Middle Finger Length, Sangli District

INTRODUCTION

Anthropometry is the systemic technique for measuring and taking observations on man, his skeleton, the skull, the limbs, trunk etc.[1]Anthropometric characteristics have direct relationship with sex, shape and form of an individual and these factors are intimately linked with each other and are manifestation of the internal structure and tissue components which in turn, are influenced by environmental and genetic factors. It is a technique used in both physical & systemic measurements of the bones of the human skull.[2-4]It is proved beyond doubt that each race requires its own formula for stature estimation. The climate and dietary habits of the people of different regions of India are variable. Racial and ethnic Stature is an important biological parameter in medico-legal forensic examination. It occurs many a times when highly decomposed or mutilated bodies or fragmentary remains of skull are brought for medico-legal examination.

Estimation of stature by the mathematical or statistical methods is a routine practice in the creation of an anthropological profile in establishing the identity of human remains, its unique feature in personal identification in events of natural disasters, murders, accidents. With increasing frequency of mass disasters like floods in Sangali district, therefore these methods will be more helpful for identification of individual.

India is big multiracial country. Each race having socioeconomic effects, genetic effect, environmental effect, so each race will require separate anthropometric study on it and so we will obtain differences

among them but we could also obtain some similarities between them. So, our aim is to obtain a co- relation between length of middle digit phalange and palm with height through regression equation.

Measurements of hand provides important guide for development of instruments and estimation of stature. Stature having definite proportion with body parts which is helpful in estimation of height. Many studies have been conducted on various parameters like long bone, facial width (Mounika[5], stature estimation from facial width, Swami S[6],-from facial measurements, Mansur DI[7]-from head circumference, Twisha Shah[8]- from cephalofacial dimensions)

AIM - To finds out the correlation between right hand – length of palm and middle finger with body height (stature).

OBJECTIVES
1. To measure the body height of individual.
2. To measure the right hand-palm length and length of middle finger of the same individual.
3. To find out the correlation between body height/stature with right hand –palm length and
length of middle finger.

MATERIAL AND METHOD
The cross-sectional study was with 100 subjects in the age group of 18-25 years native of Sangli district. The study was

conducted after taking institutional ethical clearance.

Inclusion criteria- The individual belongs to age group of 18-20 years and native of Sangli district.

Exclusion criteria- The individual having any spinal deformity, hand deformity or History of fracture of hand.

Measurements taken at fixed time to avoid diurnal variation. The individuals were measured height of body, length of right-hand palm and right hand middle finger.

Height-Height was measured from vertex to heel in upright position with individual standing bare foot with help of measuring tape.

Palm length-right hand-from midpoint between radial and ulnar tuberosity to tip of middle finger.

Middle finger length-right hand-is measured from tip of finger to proximal crease of phalange.

Statistical Analysis
Before statistical analysis the data, measurements of palm and middle finger length were converted mm into cm. The descriptive statistics were derived for height, palm and middle finger. The regression equation was derived for palm and middle digit finger to predict the height.

OBSERVATION
This is cross sectional study, after ethical committee approval data was collected and analysed.

Table No 1; Descriptive statistics of height, right hand palm length and middle digit finger length of whole data.

No	Parameter	Mean	Standard deviation	Minimum	Maximum
1	Height cm	158.28	13.93	116	198
2	Rt Hand Palm Length cm	9.72	0.54	8.44	11.07
3	Rt Hand Middle Finger cm	7.32	0.57	5.99	8.88

Table no 1, depicts that mean value and standard deviation of height was 158.28cm and 13.93 resp. The mean value of length of right-hand palm was 9.72cm and SD 0.54. And mean value of right-hand middle finger was 7.32cm and SD 0.57.

Table No 2; Descriptive statistics of height, right hand palm length and middle digit length of MALE data.

No	Parameter	Mean	Standard deviation	Minimum	Maximum
1	Height cm	165.81	12.96	143	198
2	Rt Hand Palm Length cm	9.91	0.54	8.44	11.07
3	Rt Hand Middle Finger cm	7.55	0.65	6.39	8.88

Table no 2, that depicts mean value and standard deviation of height of males was 165.81cm and12.96 was SD resp. The mean value of length of right hand palm was 9.91cm and SD 0.54. And mean value of right hand middle finger was 7.55cm and SD 0.65.

Table No 3; Descriptive statistics of height, right hand palm length and middle finger length of FEMALE data.

No	Parameter	Mean	Standard deviation	Minimum	Maximum
1	Height cm	151.5	11.11	116	171
2	Rt. Hand Palm Length cm	9.54	0.47	8.57	10.59
3	Rt. Hand Middle Finger cm	7.11	0.38	5.99	7.95

Table no 3, depicts that mean value of standard deviation of height of females was 151.5cm and 11.11 was SD. The mean value of length of right hand palm was 9.54cm and SD 0.47. And mean value of right hand middle finger was 7.11cm and SD 0.38.

Regression equation derived for length of right hand palm and right hand middle finger

Regression equation=Y=a+bx

Y=height

a= regression coefficient of dependent variable

b= regression coefficient of independent variable

x= independent variable

Table No.4; Correlation Co-efficient(r) and linear Regression Analysis of Height with Right hand Palm length and middle finger length of whole data.

Parameter	r value	Regression equation Y=a+bx
Rt hand palm length	0.46	Y=43.12+11.84 x Palm length
Rt hand middle finger length	0.60	Y=50.49+14.72 x Middle finger length

Table no 4 show correlation coefficient (r) and regression equation of length of right hand palm and right hand middle finger with body height. This table show the positive significant correlation is found between the right hand palm lengths, right hand middle finger with body height. But the middle finger is strongly positive than palm length.

Table no 5; Comparison of actual height and estimated height from hand measurements in Sangli population using regression analysis.

Parameter	Minimum estimated height	Maximum estimated height	Mean estimated height
Rt hand palm length	143.04	174.18	158.20
Rt hand middle finger length	138.66	181.20	156.91
Actual stature	116	198	158.28

Table 5, depicts comparison of actual stature and evaluated stature from hand measurements of Sangli district using regression analysis. The minimum, maximum and mean values of measurements were replaced in their particular regression equations and evaluated stature was calculated. It is noted that in every hand parameter, minimum evaluated stature is higher than actual minimum stature whereas maximum evaluated stature is less than the actual maximum stature and mean evaluated stature values are nearly equal to the actual stature because regression equations are evaluated from measures of central location or tendency.

DISCUSSION

For these study, 100 individuals were selected after institutional ethical committee approval. Written consent was taken prior the measurements. Individual was selected in the age group of 18-25 years and those belong to Sangli district. Individuals with height deformity, palm deformity, palm fracture were excluded from this study. The data was statistically analysed.

Table No 6; Comparison of correlation coefficient of right hand palm length and right hand middle finger length with previous studies.

No	Author		r value of right hand	
			Palm	Middle finger
1	A. N. Kavyashree	South Indian -female	0.412	-
		South Indian -male	0.414	-
		North Indian -female	0.367	-
		North Indian -male	0.541	-
2	Anwesa Pal	female	0.313	0.238
		male	0.224	0.275
3	Chikhalkar B.G.	-	0.590	-
4	Manpreet Kaur	female	0.550	-
		male	0.589	-
5	Ankit Srivastava	female	0.30	-
		male	0.61	-
6	Anita S Fating	female	-	0.786
7	**PRESENT STUDY**	-	**0.46**	**0.60**

Above table depicts that, r value of right hand in every study was related with height except Anwesa Pal study and females in Ankit Srivastava[9] study, Right hand of middle finger r value was strongly significant in my study and also in study of Anita but in Anwesa Pal study it shows poorly significant.

CONCLUSION

In this study, the mean height of male subjects is higher than that of female subjects.

The mean value of palm length and middle finger length is also higher in male subjects than those of female subjects.

The regression formulae derived in the present study. This study shows that height is correlated with length of right hand palm and middle finger length.

In the present study, middle finger length shows significant relation with body height.

This study is useful for forensic scientist, Anthropologist, research students.

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