

Anthropometric Data of Hand and Middle Finger Length in Both Sexes of College Students and its Correlations with Stature

G.A. Shroff *, Mandhana V.S. **, Mois Khawja ***

Abstract

Background: Estimation of an individual's stature is an important parameter in forensic examinations and anthropological studies. Morphometry of the hand provides important evidence in a crime scene investigation which helps in the estimation of stature of a criminal. Moreover, there can be anthropometric variations in different geographical areas. Aim: Determination of standard data of stature, hand length and middle finger length. To obtain correlation between these parameters. **Material and method:** 260 students were measured with 130 male and 130 Female candidates. Descriptive statistical analysis with distribution of population by skewness and Kurtosis are analyzed. Correlation between parameters were calculated with SPSS. **Result:** Middle finger length with hand length is highly correlated with Pearson Correlation 0.896 for left side and 0.892 for right side. Both parameters are Correlated with Height of person by linear correlation. Multivariate regression equations are calculated. **Conclusion:** Both hand length and Middle finger length are linearly correlated with height of person. Multivariate regression formulas are useful to calculate structure of person. These parameters are useful in ergonomics.

Keywords: Stature; Hand length; Middle finger length; Correlation coefficient.

Introduction

Adaptation of the upper extremity due to bipedal locomotion in human make the upper limb free from the burden of weight bearing. Hand become organ of prehension to manipulate the environment by a grasping mechanism.[1]

The study attempts to provide the anthropometric dimensions of the hand, foot and ear for the students in tertiary institutions in Nigeria. The study is

necessary because differences in these dimensions as a result of gender and nationalities may consequences on the design and construction of handles, gloves, foot wears, brake pedals, ear-phones and so on. [2].

Jasuja O. P. estimating stature from various parameters based on the above mentioned evidences becomes one of the most important and essential exercise for personal identification. In present paper, study on stature estimation from hand and phalanges length has been reported in 60 people. [3]

Ilayperumastudied was carried out to investigate the relationship between personal stature and hand length among a group of male and female Sri Lankan adults and to derive a linear regression formula between the hand length and height of an individual. total of 258 individuals with an age range of 20-23 years. [4].

From the present study we found some multiplication factors which were helpful for Bengali adult Muslim females for estimation of stature from respective hand length. That may be helpful for those who work in this area especially in the

Author's Affiliation: *MS Anatomy; Professor and HOD Anatomy, Department of Anatomy, MGM Medical College, Aurangabad., ** MD Anatomy; Assit. Professor, Department of Anatomy, MGM Medical College, Aurangabad., ***Tutor, Department of Anatomy, MGM Medical College, Aurangabad.

Corresponding Author: Dr. Gautam Ajit Shroff, Magan Clinic, Machali Khadak, Aurangabad 431001 Work Place: MGM Medical College, CIDCO N-6, Aurangabad.

E-mail: gashroff2006@gmail.com

various medical disciplines, anthropologists, and security experts of Bangladesh. [5]

Human beings are considered to be bilaterally symmetrical. However, there is an asymmetry in the length of the feet irrespective of sex or handedness. One hundred normal subjects (50 males and 50 females) between the ages of 19 and 25 years with no obvious deformities or previous history of trauma to the hands or feet were selected for the study. [6]

Rahulke study was planned to evaluate the correlation between middle finger length and stature of a tribal district population of India so that a formula can be derived for estimation of height for this tribal district population. A total of 100 subjects, 23 male and 77 female were included in the study. In the studied population middle finger length and stature among males and females have good correlation. [7]

In our study we found that there is strong correlation between stature and hand length and the linear regression analysis of the obtained data has provided the regression equations for nearly accurate estimation of stature in Gujarati population. Estimation of stature from hand length in Gujarat region [8]

Sample of 273 living cases (138 male and 135 female students) between the ages of 17 and 23 years with no obvious deformities or previous history of trauma to hands, feet, spine and limbs, were studied. This study shows significant correlation between stature and all five parameters at different degrees. Mathematical formulas were used for estimation of stature from Arm span, Hand length, Hand breadth, Foot length, and Foot breadth. Arm span showed the highest correlation with stature ($r=0.908$) followed by Hand length, followed by foot length. Hand Breadth showed the lowest degree of correlation (0.467). [9].

100 males and 100 females each containing 50 North Indian and 50 South Indian males and females, aged between 18-21 years. Present study shows higher mean values in each anthropometric dimension were obtained in males than in females. As far as the bilateral asymmetry is concerned, both hand length and width in North and South Indian males and females were statistically significant. In males the highest correlation co-efficient is exhibited by right hand length. Thus, hand length is the best parameter for estimating stature for males. [10]

Material and Method

Ethical committee permission was taken prior to study. Information sheet was given to all subjects and written informed consent was obtained.

In this study total of 260 students of age group of 18 to 21 years taken with 130 male and 130 female. Care is taken that no one has history of accident with fracture of extremity and not suffering from diabetic.

For measurement of hand length, both

hands was measured with Vernier Calliper length was measured from tip of middle finger or the longest finger to the centre point of inter styloid line.

Middle finger is measured from tip of finger till proximal crease of phalange in cm.

Standing height was measured with the

individual standing barefoot on the platform of the stadiometer with the upper back buttock and heels pressed against the upright position of the instrument. Head was positioned in the Frankfurt horizontal plane, and the head plate was brought into firm contact with the vertex.

Data was tabulated. Descriptive statistical and ratio between hand length and middle finger length was calculated. Test of significance applied. And Correlation

coefficient was calculated with regression equation by SPSS 19.

Results

Height is one of the indicators of identity of individual. Descriptive analysis of data indicates significant difference in male and female parameters. Both one way ANOVA and t-test signifies values 0.000.

Range of male height in male population is 147 to 193 cm and female population is 124 to 180.34 cm. Normal distribution shows mesocentric distribution of population. F value is 206.528 and highly significant 0.000.

Hand length and middle finger length shows difference in length in both right and left hands with significant difference in both sexes.

Table 1: Height in (cm)

	Male	Female
Mean	171.49	157.98
Std. Dev.	7.56	7.59
Std. Er. Mean	0.66	0.67
Min	147	124.46
Max	193.04	180.34
Skewness	-0.158	-0.905
Kurtosis	0.576	0.212

Fig. 1: Graph of mean Height in cm

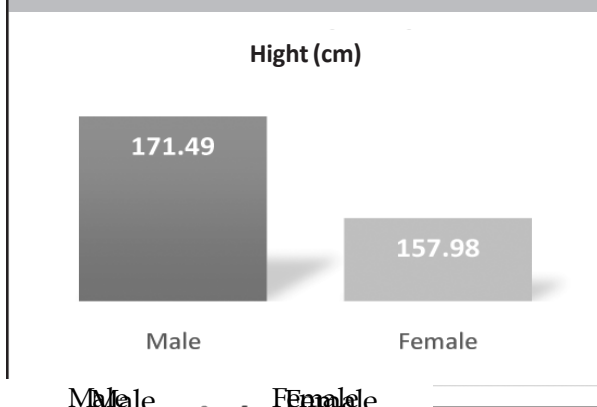


Fig. 2: Hand Length Mean Values

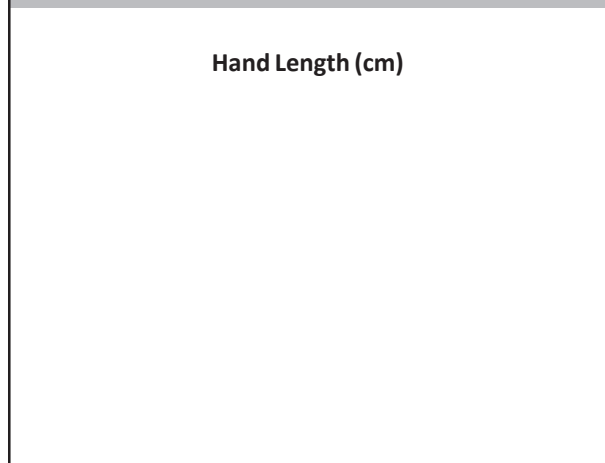
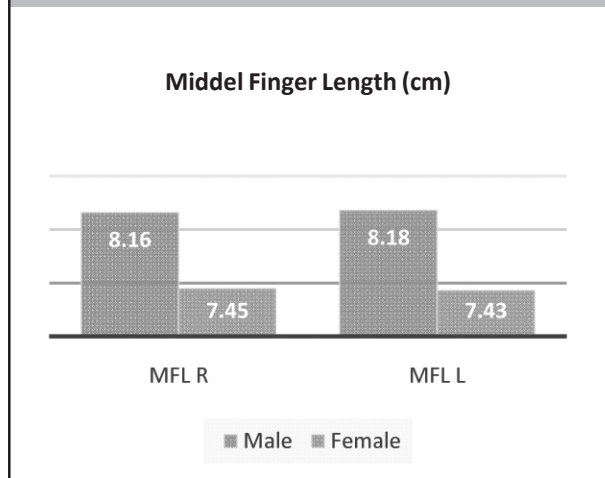


Fig. 3: Middle Finger Length (cm)



Eq3: Height = 85.945 - 2.947 * Right hand length + 4.991 * Left hand length + 5.302 * Right middle finger length + 0.080 * Left middle finger length (R=0.59).

Discussion

Estimation of an individual's stature is an important parameter in forensic examinations and anthropological studies. Morphometry of the hand provides important evidence in a crime scene investigation which helps in the estimation of stature of a criminal. The available data usually apply to Caucasians in Europe or North America. Only few studies of other racial groups exist which emphasize the need to establish standards in different ethnic populations[4].

In this study students from central India has been calculated. Mean value for height is higher in male than in female population.

Table 2: Hand Length in cm

	Male	Female	Male	Female
Mean	19.46	18.95	18.53	17.54
Std. Dev.	0.96	0.95	1.53	1.54
Std. Er. Mean	0.08	0.08	0.04	0.04
Min	16.7	16.3	15.3	15.2
Max	21.8	21.8	21.3	21.3
Skewness	0.24	0.28	0.76	0.62
Kurtosis	0.93	0.52	0.79	0.61

Legend: ■ Male ■ Female

Table 3: Middle Finger Length (cm)

	Male	Female
Mean	8.16	7.45
Std. Dev.	0.96	0.95
Std. Er. Mean	0.08	0.08
Min	16.7	16.3
Max	21.8	21.8
Skewness	0.24	0.28
Kurtosis	0.93	0.52

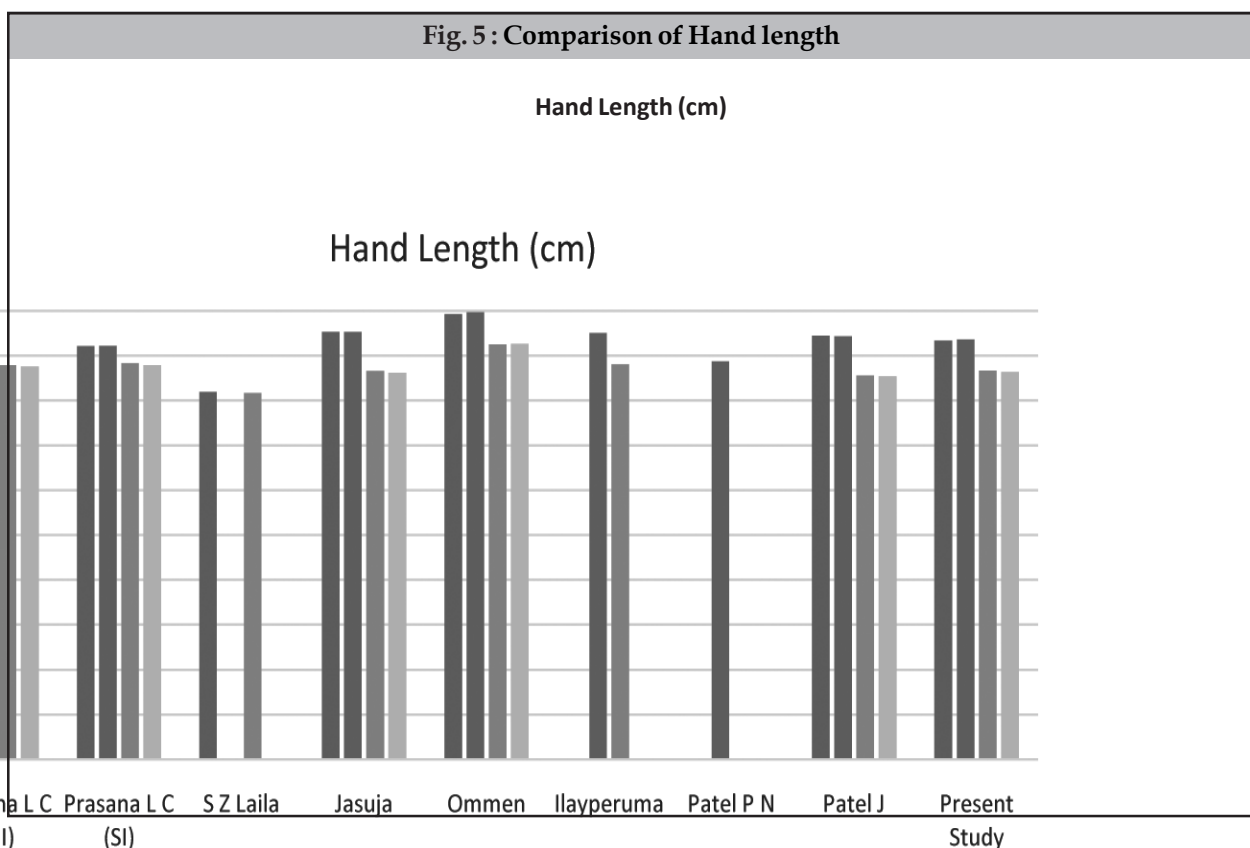
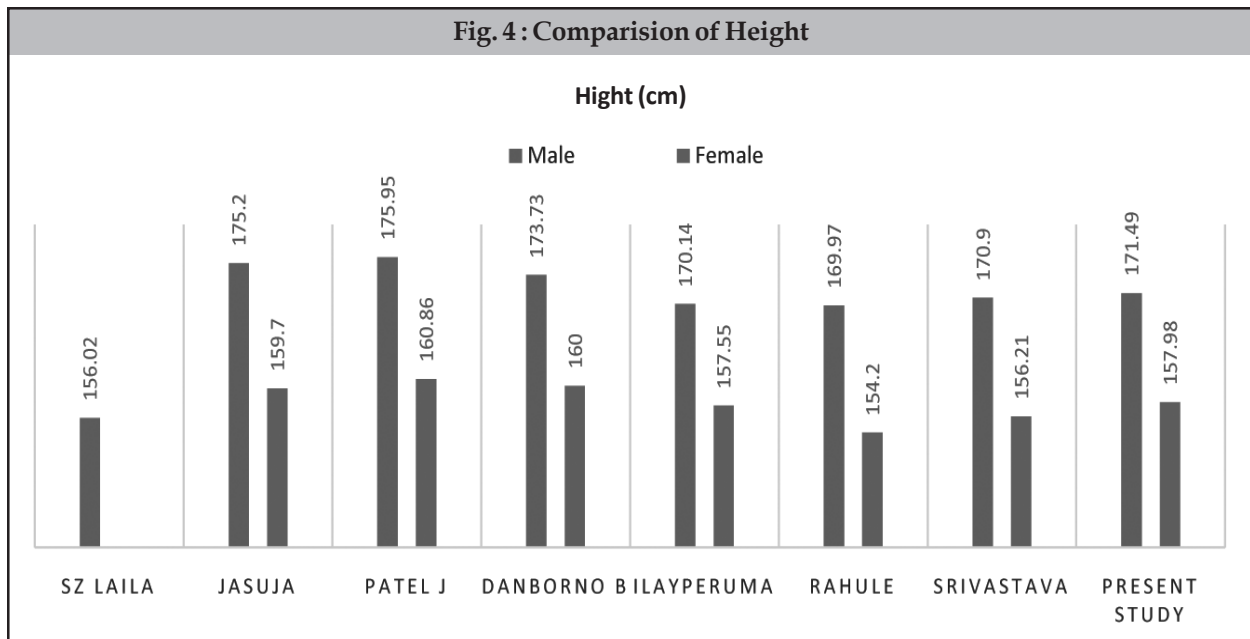
Table 4 : Comparison of Hand Length (cm)

Sr.No	Authors	Measurements	Sex	Side	Min	Max	Mean	± SD	± SE
1	Prasana L C	North	Male	Right			18.78		
				Left			18.8		
			Female	Right			17.58		
				Left			17.52		
			Male	Right			18.42		
				Left			18.44		
Female	Right			17.67					
	Left			17.59					
2	SZ Laila	Hand length	-	Right			16.39	0.79	
				Left			16.34	0.8	
3	Jasuja ³⁴ (2003)	Hand length	Male	Right	18.4	21.3	19.06	0.73	0.13
				Left	18.2	21.2	19.06	0.76	0.13
			Female	Right	19.1	19.7	17.32	0.81	0.14
				Left	19.1	19.9	17.24	0.8	0.14
4	Ommen	Hand length	Male	Right			19.85	0.86	
				Left			19.93	0.93	
			Female	Right			18.51	0.66	
				Left			18.52	0.77	
5	Ilayperuma ⁵⁵ (2009)	Hand length	Male	-	-	-	19.01	5.22	-
			Female	-	-	-	17.62	0.93	-
6	Patel P N	Hand length		-	-	-	17.75	1.09	-
7	Patel J	Hand length	Male	Right			18.89		
				Left			18.86		0.08
			Female	Right			17.11		
				Left			17.08		0.11
8	Present Study (2014)	Hand Length	Male	Right	16	21.7	18.67	0.93	0.081
				Left	16.3	21.8	18.72	0.95	0.084
			Female	Right	15.3	24	17.34	1.23	0.1
				Left	15.2	21.6	17.27	1.14	0.1

With statistically significant. As also observed by Jasuja O.P., Patel J, but comparative values are higher than present study [3,8].

Hand length shows higher values in male than in female as in other studies. Correlation coefficient are on higher side in present study than in Jasuja O.P.; IlayerumaIsurani; Laila SZ; Patel J.Oommen A.; Prasana L. L. [3-8].

Very few studies had been carried out on middle finger length as in Rahule [7]. It shows good correlation with both height and Middle finger length. Middle finger length on right side is more in male than female. Regression equations had been calculated with multiple regression. With improved correlation coefficient. Rest other studies shows univariate analysis.



Conclusion

In this following inferences can be deduced
 Hand length is highly correlated with middle dfinger length.

■ Male R ■ Male L ■ Female R ■ Female L

Middle finger length is positively correlated with both hand length and height of person.

Multiple correlation regression equation gives better predictive value for height.

Following data and equations can be useful for forensic purpose and in designing of instruments or in ergonomics.

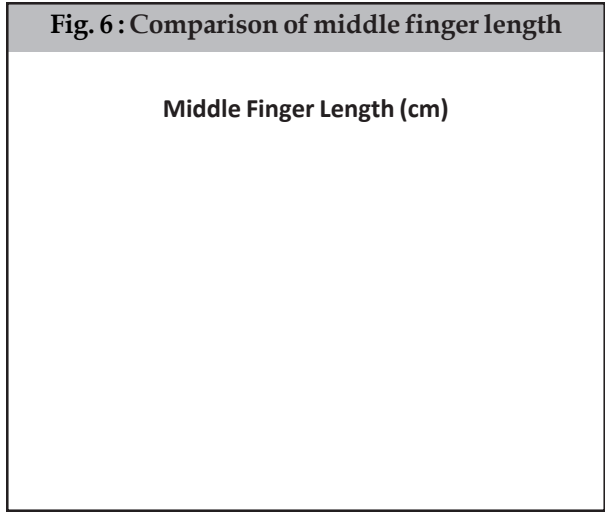
Table 5 : Comparison of Height (cm)	
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Table 6 : Comparison of Middle Finger length (cm)	
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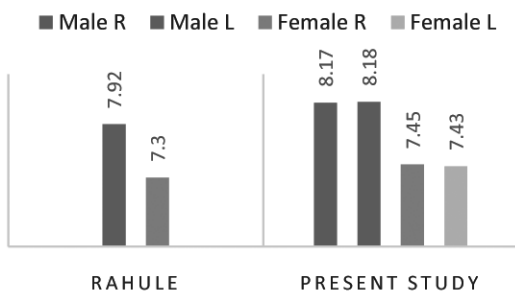
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MIDDLE FINGER LENGTH (CM)



STUDY ON THE CORRELATION OF MIDDLE FINGER LENGTH AND STATURE IN A SAMPLE OF UNIVERSITY STUDENTS IN NIGERIA

Association of Middle Finger Length and Stature in a Sample of University Students in Nigeria

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