

Estimation of stature from middle finger length among college students in Mangalore

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Abstract

The present study was conducted in Mangalore University to know the relationship of stature with middle finger length among 150 students, including 75 male and 75 female belonging to the age group of 17-22 years. Pearson's formula was used to calculate the stature and it was found that middle finger length and the height of the individual have a very good correlation with a coefficient of 0.658 and p value of <0.001 which is highly significant.

Keywords: Stature, middle finger, Anthropometry, Mangalore

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INTRODUCTION

Identification determines the individuality of a person based on certain physical characteristics in living or dead person, mutilated bodies, decomposed bodies and skeletons and is one of the most important factors in completing the crime investigation. It is important in civil cases like marriage, disputed sex, missing person, inheritance, passport, and in criminal cases like murder, assault and impersonation¹. The most important objective of Forensic investigation is to establish the identity of an individual, particularly in case of mass disaster both natural and man-made like earthquakes, cyclones, tsunamis, flood, terror attacks, bomb blasts, accidents, wars and plane crashes. When only the mutilated or fragments of the body are available for examination it is very challenging work for the medicolegal experts to identify a body^{2,3}. Height is an important component that reflects the identity of a person and can be estimated using different methods. In most of the instances long

bones like humerus, radius, tibia and femur are being used⁵. A comparative study on stature, length with middle finger was done by Macdonnel on 3000 English criminals⁴. Pearson (1899), Trotter and Glesser (1952) have done studies on estimation of stature from skeletal remains as indicated by their published work mostly on long bones^{6,7}. This study is an attempt to find out whether there is any difference or similarity in the estimation of stature using the middle finger of both the hands in both male and female.

METHODOLOGY

A prospective study was carried out with a sample size of 150 in Mangalore University, which included 75 male and 75 female students belonging to the age group of 17-22 years to know the relationship of stature with middle finger length. Those students with a birth defect or disease, hand deformity due to injury, fracture, any surgical procedure of either hand or foot and bandaged fingers were excluded from the study. The height of the individual was measured between the vertex and floor using standard height measuring instruments (Stadiometer in Frankfurt's Plane) with all necessary instruction given to the participants. Finger length was measured using digital vernier caliper by measuring the distance from the most proximal flexion crease of middle finger till the projecting point on the tip of the middle finger. Same procedure was done in both the hands. The data collected was analysed using Pearson correlation for stature and middle finger length.

RESULT

From the data collected from 150 students average middle finger length was determined between the left and the right and then the quartiles were calculated. Based on these the middle finger length was categorized into four units.

Table 1: Pearson’s correlation of age, stature and middle finger

2.808375	FIRST QUARTILE
2.94575	SECOND QUARTILE
3.053875	THIRD QUARTILE
3.562	FOURTH QUARTILE

Table 2: Descriptive Statistics Age, Stature and Middle finger eight

	Mean	Std. Deviation	N
Age	19.11	.901	150
Stature	158.6753	7.88426	150
AVERAGE MIDDLE FINGER HEIGHT	2.9375	.17697	150

Table 3: Pearson’s correlation of stature and middle finger

		Stature
	Pearsons correlation	0.658
Average middle finger height	sig. (2 tailed)	<0.001
	n	150

It was found from the study that Age and stature do not correlate well whereas middle finger length and the height of the individual have very good correlation with a coefficient of 0.658 and p value of <0.001

Table 4: Distribution of height as per categories

		MIDDLE FINGER LENGTH							
		<2.8		2.8-2.95		2.95-3.05		3.05-3.6	
		Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Stature		152.14	5.35	156.86	5.67	159.10	5.71	165.72	7.80
AVERAGE MIDDLE FINGER HEIGHT	MIDDLE	2.71	.07	2.87	.05	2.98	.02	3.15	.12
Rt.Mid. Fr(mm)		2.73	.08	2.87	.05	2.99	.03	3.15	.12
Lt.MidFr(mm)		2.70	.10	2.88	.06	2.98	.03	3.16	.13

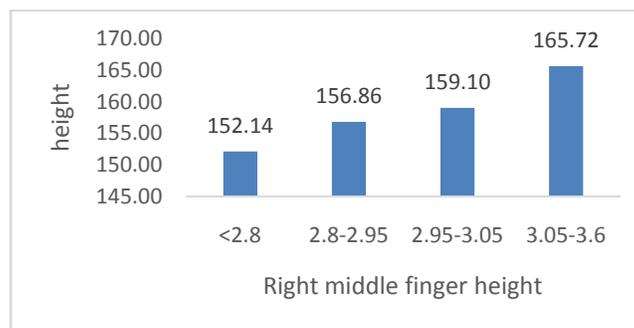


Figure 1: Graphical Presentation of Right middle finger height and stature

For right middle finger measuring less than 2.8 mm the stature was found to be 152.14cm, right middle measuring less than 2.8 -2.95 mm the stature was found to be 156.86cm right middle measuring less than 2.95 – 3.05 mm the stature was found to be 159.10cm and rightmiddle measuring less than 3.05 – 3.6 mm the stature was found to be 165 .72.

Linear regression

Table 5(a): Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.658 ^a	.433	.429	5.95591

a. Predictors: (Constant), AVERAGE MIDDLE FINGER HEIGHT

Note the r value is same as the pearsons correlation coefficient.

Table 5(b): ANOVA^a

Model	F	P value
1 Regression	113.104	<0.001

a. Dependent Variable: Stature

b. Predictors: (Constant), AVERAGE MIDDLE FINGER HEIGHT

Table 5(c)

Coefficients						
Model	Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	72.542	8.114		8.941	<0.001
	AVERAGE MIDDLE FINGER HEIGHT	29.322	2.757	.658	10.635	<0.001

a. Dependent Variable: Stature

Table 5 (a,b,c) Shows the linear regression for stature which is $Stature = 75.532 + 29.322 \times \text{average middle finger height}$

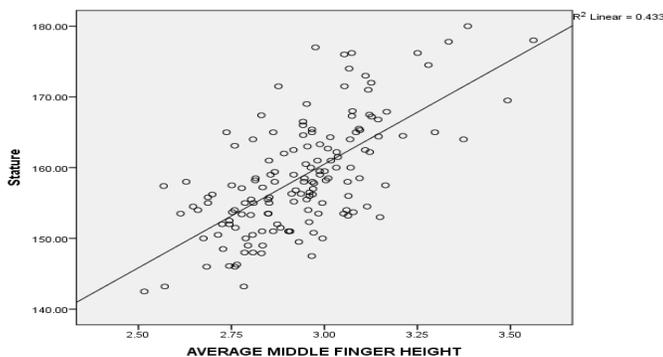


Figure 2: Scattered graphical presentation of stature and middle finger

This graph indicates that as the middle finger height increases the stature also increases the r square value of .433 indicates that 43.3% of the cases the height and middle finger length are correlating.

DISCUSION

One of the important parameter in medicolegal examination and anthropological studies is the estimation of stature. Different studies have been conducted using different parameters to estimate the stature and the current study was being carried out to find whether the height of middle finger length helps in the estimation of stature.

Present study in its comparison with other Authors

S.NO	AUTHOR	YEAR	SUBJECT AND PLACE	RESULT
1.	Verghese	2010	100 students from JSS Mahavidyapeetha, Mysore.	Best finger to estimate the height was the left thumb in case of males and right thumb in case of females.
2.	Jethva	2013	510 (258 males and 252 females) belonging to Gujarat region.	Positive correlation between Height and Hand Length found which was statistically significant
3.	Agrawal	2013	100 males and 100 females of S.N. Medical College, Jodhpur, Rajasthan.	Significant correlation between the stature and hand lengths and phalangeal length.

4.	Shivakumar	2013	100 males from SSIMS and RC campus, Karnataka	Correlation present between stature and right middle finger length and which was statistically significant
5.	Pandey	2015	200 medical students of MGM Medical College, Navi Mumbai, Maharashtra.	Correlation present between stature and hand dimensions and it was statistically highly significant.
6.	Present study	2016	150 students (75 male and 75 female) from Mangalore university.	Correlation present between stature and right middle finger length and which was statistically significant

The present study shows that there a significant relationship between stature and middle finger length which is similar to the study conducted by Shivakumar in 2013 where there was a correlation between stature and middle finger length. Similarly Verghese in 2010 reported the best finger to estimate the height was the left thumb in case of males and right thumb in case of females. Agarwal (2010) and Pandey (2015) conducted studies on stature and hand lengths and found that it was significant.

CONCLUSION

The study showed significant positive correlation between the Stature and middle finger length. Simple linear regression equation so far derived can be used for estimation of height, if middle finger length is known. These types of studies are of medico legal importance in establishing identity of an individual when only fragments of the body are available and also in anthropological studies to know the difference between different population groups. After the complete statistical analysis of the data a regression equation was found that stature can estimated from the measurement of right middle finger height using the formula $\text{Stature} = 75.532 + 29.322 \times \text{average middle finger height}$.

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