Estimation of Stature from Ring Finger Length: A Quantitative Appraisal amidst Young Indian Population

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Abstract

Estimation of stature or height of a person is subject to variations during life due to muscular relaxation and elasticity of intervertebral discs but could be still valuable in identification. Stature estimation from dismembered body parts can be done based on the ratio of the body part concerned, in relation to the entire body. Many previous studies insisted that regression equation for stature estimation from various body measurements should be population specific. Since there is a need to develop a separate regression equation for estimation of stature from ring finger length for a particular population. So, the present study is undertaken with the aim, to determine correlation between ring finger length and stature of a person and to develop regression equation to estimate stature from ring finger length for both the sexes separately. The present study was carried in the Department of Forensic Medicine and Toxicology, ESIC Medical College, Kalburagi in collaboration with Department of Anatomy, AIIMS Rajkot. Total 140 students (70 males and 70 females) from ESIC Medical College, Kalburgi were randomly selected for the study. Preliminary data like age, sex and address were noted. Height, length of both right and left ring finger length of each student were measured. In the present study, stature shows good positive correlation coefficient with ring finger lengths. For males, Correlation Co-efficient of Height with Right Ring Finger Length and Left Ring Finger Length are 0.405 and 0.334 respectively which show moderate degree positive correlation. Similarly, for females Correlation Co-efficient of Height with Right Ring Finger Length and Left Ring Finger Length are 0.515 and 0.629 respectively which shows high degree positive correlation.

Keywords: Stature; Height; Ring Finger length; Regression equation; correlation coefficient.

Introduction

Estimation of stature or height of a person is subject to variations during life due to muscular relaxation and elasticity of intervertebral discs but could be still valuable in identification. Stature estimation from dismembered body parts can be done based on the ratio of the body part concerned, in relation to the entire body[1]. Identification of a dead victim often helps the police to trace the victim's movement, to know the background. If victim's identity is not known, it becomes difficult for the police to solve the crime. The identification of the dead body and corpus delicti is important before sentence is passed in murder trials[2]. Among identification data's stature along with age and sex are considered as primary characteristics of identification[2]. Many studies have established the relationship between stature and hand anthropometry[3-8]. Several authors have offered regression equations based on the length of long bones; however, it is well known that formulae that apply to one population do not always give accurate results for other populations. Pearson stated that a regression formula derived for one population should be applied to other groups with caution[9]. Many previous studies insisted that regression equation for stature estimation from

various body measurements should be population specific. Since there is a need to develop a separate regression equation for estimation of stature from ring finger length for a particular population. So, the present study "**Estimation of Stature from Ring Finger Length**" is taken with the aim,

a. To determine correlation between ring finger length and stature of a person.

b. To develop regression equation to estimate stature from ring finger length for both sexes separately.

Materials and Methods

The present study was carried in the department of Forensic Medicine and Toxicology, ESIC Medical College, Kalaburagi. Total 140 students (70 males and 70 females) from ESIC Medical College, Kalaburagi were randomly selected for the study. Preliminary data like age, sex and address were noted. Height, length of both right and left ring finger length of each student was measured during the time period of 2.00 pm to 4.00 pm to eliminate diurnal variation of height and by the same observer, using the same instrument to avoid personal error in methodology.

Inclusion criteria: Students aged between 18 and 25 years. This age group was chosen because the growth of an individual ceases by this age and there is no age-related loss in body height at this age.

Exclusion criteria: Subjects possessing injuries or deformities in the ring finger of the hand, history of skeletal injuries, and who are on any form of hormonal medications were excluded from the studies.

Method used for taking finger length: The length of the ring finger (RFL) of the left and right hand of each subject were measured with the aid of manual Vernier caliper, from the tip of the digit to the ventral proximal crease, where there was a band of crease at the base of the digit, the most proximal crease was used.

Method used for taking stature (height): Stature was estimated from vertex to the floor with feet axis parallel and head in Frankfort plane.

Observations

The statistical data which are extracted from calculation are tabulated in Table-1, Table-2, Table-3 & Table-4.

Table 1: Shows Average, Standard Deviation and Median for Height, Right Ring Finger and Left Ring Finger Length.
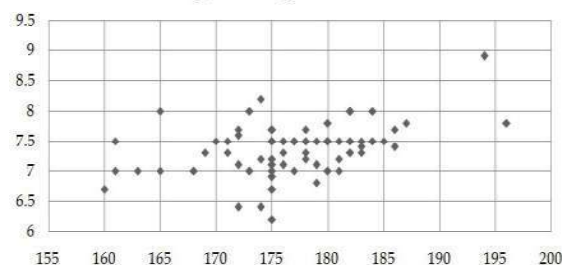
All in centi-meters	Average		Standard Deviation		Median	
	M	F	M	F	M	F
Height	176.66	160.21	6.69	7.22	176.66	162.0
Rt. Ring Finger Length	7.38	6.77	0.429	0.435	7.5	6.8
Lt. Ring Finger Length	7.37	6.76	0.429	0.407	7.5	6.8
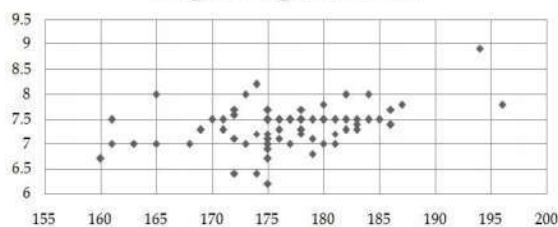
Graph 1: Scatter diagram showing Correlation of Height with Right Ring Finger Length in Males.

Graph 2: Scatter diagram showing Correlation of Height with Left Ring Finger Length in Males.
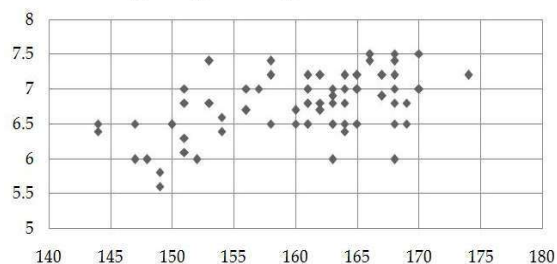
Graph 3: Scatter diagram showing Correlation of Height with Right Ring Finger Length in Females.
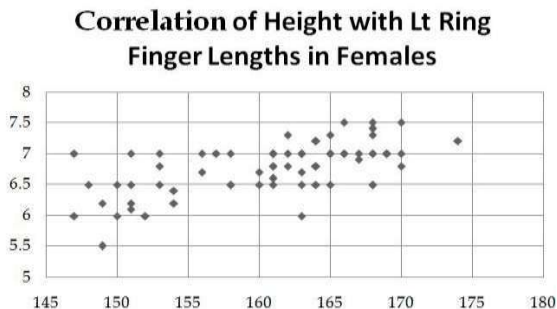
Graph 4: Scatter diagram showing Correlation of Height with Left Ring Finger Length in Females.

Table 2: Shows Correlation co-efficient of Height with Right Ring Finger Length and Left Ring Finger Length separately for male and female.

Type of Correlation	Male	Female
Correlation of Height with Right Ring Finger length	0.405	0.515
Correlation of Height with Left Ring Finger length	0.334	0.629

For males, Correlation Co-efficient of Height with Right Ring Finger Length and Left Ring Finger Length are 0.405 and 0.334 respectively which show moderate degree positive correlation.

Similarly, for females Correlation Co-efficient of Height with Right Ring Finger Length and Left Ring Finger Length are 0.515 and 0.629 respectively which shows high degree positive correlation.

Table 3: Regression Formulae developed for stature estimation is shown in Table.

Participants	Regression Equation
Males	Height = 59.96 + 15.81X Right Ring Finger Length
	Height = 52.81 + 16.80X Left Ring Finger Length
Females	Height = 37.7 + 18.12X Right Ring Finger Length
	Height = 1.8 + 23.96X Left Ring Finger Length

Standard Error	Male	Female
Right Ring Finger length	6.215	6.286
Left Ring Finger length	6.215	5.699

Discussion

In the present study stature shows good positive correlation coefficient with ring finger lengths. For males, Correlation Co-efficient of Height with Right Ring Finger Length and Left Ring Finger Length are 0.405 and 0.334 respectively which show moderate degree positive correlation.

Similarly, for females Correlation Co-efficient of Height with Right Ring Finger Length and Left Ring Finger Length are 0.515 and 0.629 respectively which shows high degree positive correlation10. Whereas in a study done by Sharma R. and Dhattarwal S.K., shows correlation coefficient between height and RFL+0.30 in male and +0.15 in female. In male it shows moderate degree of correlation whereas in female it shows less degree of correlation.[11] In a study conducted by suseelamma et. al. also showed positive correlation in case of RFL with the stature in the genders.[12] Tyagi et al studied the subjects from Delhi and found positive correlation between stature and Ring & Index finger lengths and have suggested that index finger was best for the prediction of stature in both males and females.[13] Rastogi et al estimated stature from middle finger and noted a positive correlation that ranged from 0.504 to 0.696 between middle finger length and stature while studying the north and south Indian population.[14] According to study conducted by Bardale R. V., et. al., amongst males, correlation was higher between the ring finger length and stature (right hand r = 0.546 and left-hand r = 0.572). In females, correlation was higher between index finger and stature (right hand r = 0.618 and left-hand r = 0.612).[15]

Conclusion

The results of the present study indicate that Ring Finger length can be efficiently used for estimation of stature. Most authors have underlined the need for population-specific stature estimation formulae. The main reason for this is the ratio of various body parts differs from one population to another. In addition to ethnic differences, secular trend, and even environmental factors such as socioeconomic and nutritional status can influence body proportion. So, in this study we derived a separate regression equation for male and female to estimate stature from Ring finger length for this region.

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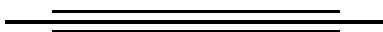
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