

ROLE OF HAND LENGTH IN PREDICTION OF STATURE

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ABSTRACT

Introduction: Identification is the determination of the individuality of a person based on certain physical characteristics. In partial or complete Identification many Identification datas are considered, among them Stature, Age and Sex are three primary characteristic datas in Identification.

Materials and Methods: The present study is carried out in E S I C Medical College, Kalaburagi, Karnataka. Total 257 students (120 males and 137 females) between age group of 18-25 years born in Karnataka are selected. Students with hypochondriasis, achondriasis, and congenital anomalies of bone and with fractures of lower limb and upper limb are excluded from the study. The height of the students, length of both right and left Hand of each student is measured by the same observer with the same instrument and at the same time.

Results: For males, Correlation Co-efficient of Height with Right Hand Length and Left Hand Length are .513 and .516 respectively which shows moderate positive correlation. Similarly for females Correlation Co-efficient of Height with Right Hand Length and Left Hand Length are .64 and .65 respectively

Discussion and Conclusion: The results of the present study indicate that hand lengths can be efficiently used for estimation of stature. In present study female hand length can give better prediction of stature compared male.

KEY WORDS: Stature, Hand Length, Correlation Co-efficient, Regression Equation.

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INTRODUCTION

Identification is the determination of the individ-

uality of a person based on certain physical characteristics. In partial or complete Identification

many Identification datas are considered, among them Stature, Age and Sex are three primary characteristic data in Identification [1]. Victim's identity is very important for Investigating Officer to solve crime. Identification is easy when the whole body is available. But it becomes difficult when only part of the body is found due to many reasons. Body measurements have direct relationship with shape, sex and form of an individual and these factors are intimately linked with each other and manifestation of internal structure and tissue components which in turn are influenced by environmental and genetic factors [2]. Among the various parameters of identification, individual's stature is an inherent characteristic, the estimate of which is considered to be important in those cases where only fragmentary or mutilated remains of an unknown person are recovered [3]. In ancient time physician and surgeon like Charaka and Sushruta were well acquainted with the relation of different parts of body and height. According to Charaka, the height of an average man should be 84 anguls, thigh - 21 anguls, leg - 19 anguls, forearm - 15 anguls and arm- 16 anguls [4].

It is shown in earlier studies that various measurements of the body tend to differ in various ethnic groups [5]. Consequently, the formulae designed to estimate stature from various anatomical dimensions in one population do not apply to another [6,7].

Every study have mentioned about the need for developing separate regression equation for specific region. So there is a need to develop a separate regression formula for stature estimation from various parameters for a particular population. Hence the present study Role of Hand Length in Prediction Stature is taken.

MATERIALS AND METHODS

The present study is carried out in E S I C Medical College, Kalaburagi, Karnataka. Total 257 students (120 males and 137 females) between age group of 18-25 years born in Karnataka are selected. Students with hypochondriasis, achondriasis, and congenital anomalies of bone and with fractures of lower limb and upper limb are excluded from the study. The height of the students, length of both right and left Hand of

each student is measured by the same observer with the same instrument and at the same time. Hand length was defined as the direct linear distance between the distal wrist crease and the distal end of the most anterior projecting point, i.e., tip of the middle finger. The subjects were asked to place their hands supine on a flat hard horizontal surface with fingers extended and adducted, following which the hand length was measured. Care was taken to see that there was no abduction or adduction at the wrist joint, i.e., the forearm was directly in line with the middle finger. Hand lengths were taken independently on left and right side of each individual using a sliding calliper capable of measuring to the nearest 0.01 mm.

Stature is measured as the vertical distance between the point vertex and the heel touching the floor (ground surface). Technique: The subject was made to stand in erect posture against the wall with the feet axis parallel or slightly divergent and the head balanced on neck and measurement was taken without any wear on head and foot using the Anthropometric rod. Average of three readings of stature, right hand length and left hand length are taken.

After collection of data, it is subjected to statistical analysis. Mean, Standard Deviation and Range for Height, Right Hand Length and Left Hand Length, is calculated separately for males and females.

Correlation of Height with Right and Left Hand length is calculated separately for males and females.

RESULTS

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

Table 1: Shows Mean, Standard Deviation and Range for Height, Right Hand Length and Left Hand Length.

All in centimeters	Mean		Standard Deviation		Range	
	Male	Female	Male	Female	Male	Female
Height	172.41	157.47	6.51	5.66	158-194	145-169
Rt. Hand Length	18.76	16.95	0.88	0.83	16.6-20.5	15-18.6
Lt. Hand Length	18.84	16.96	0.86	0.82	16.6-20.6	15-18.5

For males, Correlation Co-efficient of Height with Right Hand Length and Left Hand Length are .513 and .516 respectively which shows moderate positive correlation. Similarly for females

Correlation Co-efficient of Height with Right Hand Length and Left Hand Length are .64 and .65 respectively which also shows moderate positive correlation.

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

	Male	Female
Correlation of Height with Right Hand length	0.513	0.64
Correlation of Height with Left Hand length	0.516	0.65

Table 3: Regression Formulae developed for stature estimation.

	Regression Equation
Males	Height = 96.238 + 4.024 Right Hand Length
	Height = 94.353 + 4.116 Left Hand Length
Females	Height = 87.6 + 4.12 Right Hand Length
	Height = 84.6 + 4.30 Left Hand Length

Fig. 1: Showing the Correlation of Height with Right Hand Length in Males.

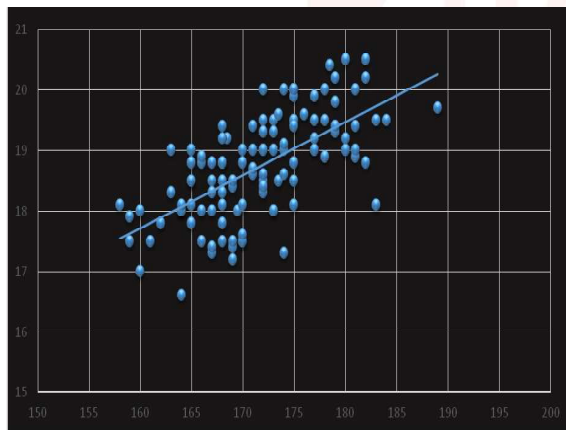


Fig. 2: Showing the Correlation of Height with Left Hand Length in Males.

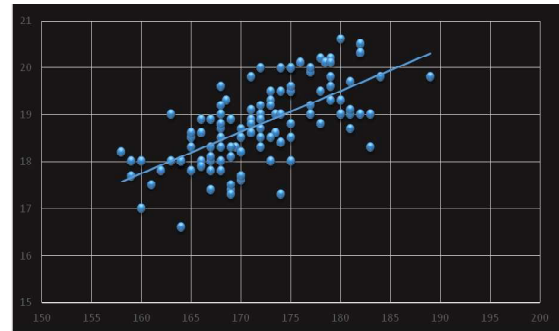


Fig. 3: Showing the Correlation of Height with Right Hand Length in Females.

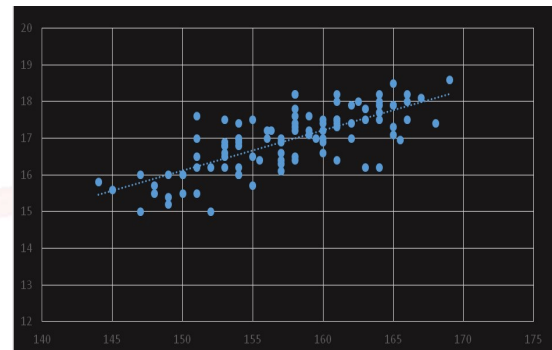


Fig. 4: Showing the Correlation of Height with Left Hand Length in Females.

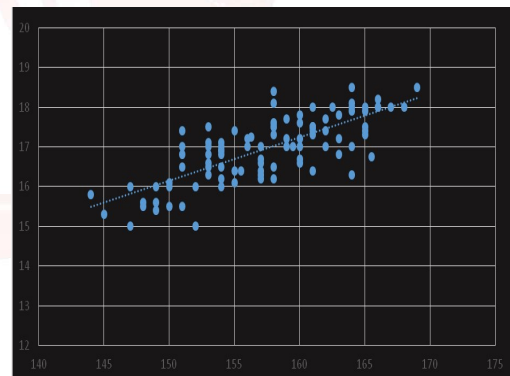


Table 4: Shows comparison between correlation coefficient and regression equations as derived in studies of different ethnic groups in India.

Studies done in different ethnic groups	Correlation coefficient Male	Correlation Coefficient female	Regression equation to measure stature in males	Regression equation to measure stature in females
Khanpurkar & Radke 2012 [8]	0.616	0.647	ST = 92.1 + (4.2) HL	ST = 84.9 + (4.3) HL
Ilayperuma et al 2009 [9]	0.58	0.59	ST = 103.37 + (3.49) HL	ST = 93.70 + (3.63) HL
Sunil et al 2005 [10].	0.7 (R) 0.6 (L)	0.7 (R) 0.7 (L)	ST= 86.93+(4.25) HLRT ST= 85.44+(4.32)HLLT	ST= 77.42+ (4.56) HLRT ST= 80.94+ (4.4) HLLT
Jasuja OP 2004 [11]	0.502 (R) 0.452 (L)	0.529 (R) 0.557 (L)	ST= 69.51+(5.22) HLRT ST= 84.74+ (4.5) HLLT	ST= 130.95+(1.61) HLRT ST= 130.04+(1.66) HLLT
Krishan K et al 2012 [12]	NA	NA	ST= 87.33+(4.45) HLLT	ST= 84.539+(4.238) HLLT
Patel JP et al 2014 [13]	0.510 (R) 0.504 (L)	0.512 (R) 0.514 (L)	ST=125.15+(2.69) HLRT ST=125.67 + (2.67) HLLT	ST=110.64 + (2.95) HLRT ST = 110.69 + (2.95) HLLT
Present Study	0.513 (R) 0.516 (L)	0.64 (R) 0.65 (L)	ST = 96.238 + 4.024 HLRT = 94.353 + 4.116HLLT	ST = 87.6 + 4.12 HLRT = 84.6 + 4.30 HLLT

DISCUSSION

Results of present study shows that Hand length of females can give better prediction of height when compared with Hand length in males. Correlation of height with right and left hand length for male are 0.513 and 0.516 respectively, which shows moderate correlation. And in female, correlation of height with right and left hand length is 0.64 and 0.65 which also shows moderate correlation. In this study we have derived a separate regression equations for both Right and Left hand Length for males and females to estimate accurate stature of individual.

CONCLUSION

The results of the present study indicate that hand 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 differ from one population to another. In addition to ethnic differences, secular trend¹⁴ and even environmental factors such as socio-economic and nutritional status can influence body proportion¹⁵. So in this study we derived a separate regression equation to estimate stature from Hand length for Karnataka region.

Conflicts of Interests: None

REFERENCES

- [1]. Reddy KSN. Identification. Essentials of Forensic Medicine and Toxicology, 31st edition; K. Suguna Devi: Hyderabad, 2012; p.51.
- [2]. Prasad A., Bhagwat VB., Porwal S. et al. Estimation of Human Stature from length of ulna in Marathwada Region of Maharashtra. *Int J Biol Med Res.* 2012;3(4):2337-2341.
- [3]. Sunil, Dikshit PC, Aggrawal A. Estimation of Stature from Hand Length. *JIAFM*, 2005;27(4). ISSN 0971-0973.
- [4]. Mondal MK, Jana TK, Das J et al. Use of length of Ulna for estimation of Stature in living adult male in Burdwan District and adjacent areas of West Bengal. *J. Anat. Soc. India* 2009;58(1):16-18.
- [5]. Davies BT, Benson AK, Courtney A, Minto I. A comparison of hand anthropometry of females in the three ethnic groups. *Ergonomics* 1980;23:183-4.
- [6]. Williams PL, Bannister LH, Berry MM, Collins P, Dyson M, Dussek JE. *Gray's Anatomy: The anatomical basis of Medicine and Surgery.* 38 Ed; Churchill Livingstone: New York, 2000; Pages 425-436.
- [7]. Athawale MC. Anthropological study of height from length of forearm bones. A study of one hundred Maharashtrian male adults of ages between twenty five and thirty years. *American Journal of Physical Anthropology* 1963;21:105-12.
- [8]. Khanpurkar S & Radke A. Estimation of stature from the measurement of foot length, hand length and head length in Maharashtra region. *IJBAMR*, 2012;1(2):77-85.
- [9]. Ilayeruma I et al. Prediction of personal stature based on the hand length. *Galle Medical Journal.* 2009;14 (1):15-18.
- [10]. Sunil et al. Estimation Of Stature From Hand Length *JIAFM*, 2005;27(4):971-973.
- [11]. Jasuja OP & Singh G. Estimation of stature from hand and phalange length. *JIAFM*, 2004;26(3).
- [12]. Krishan K et al. Multiplication factor versus regression analysis in stature estimation from hand and foot dimensions. *Journal of Forensic and Legal Medicine.* 2012;19:211-214.
- [13]. Patel JP, Patel BG, Shah RK, Bhojak NR, Desai JN. Estimation of stature from hand length in Gujarat region. *Journal of Medical Sciences.* Jan 2014;3(1):41-44.
- [14]. Meadows L., Jantz RL., Allometric secular change in the long bones from the 1800s to the present. *J. Forensic Sci* 1995;40:762-7.
- [15]. Malina RM. Ratios and derived indicators in the assessment of nutritional status. In: Himes JH, Editor *Anthropometric assessment of nutrition status.* New York: Wiley-Liss; 1991. p. 151-71.

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