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IP International Journal of Forensic Medicine and Toxicological Sciences

Journal homepage: <https://www.ipinnovative.com/journals/IJFMTS>

Original Research Article

Estimation of stature from hand length of an individual in central India population

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ARTICLE INFO

Article history:

Received 23-12-2020

Accepted 28-12-2020

Available online 07-01-2021

Keywords:

Anthropometry

estimation of stature

height

hand length

establishment of identity

ABSTRACT

Anthropometry is a important parameter in medico- legal investigation, in which stature has vital importance in identification of individual. Estimation of stature is important when fragments or remnants or parts of body are found on crime scene. So, the aim of this study is to develop a regression formula to indicate relation between height and hand length of individuals of both sexes. The study was conducted on 159 healthy individuals (75 males and 84 females). Prior permissions were taken from Institutional ethics Committee and written informed consent from all subjects were taken prior to data collection. Linear regression equation was derived using SPSS 23 software. There was a linear correlation between height and hand length. Pearson correlation coefficient found significant at P value – 0.01 (P value <0.05) between height and hand length.

The study will significant to medico-legal experts in estimating stature from remnants of upper limb.

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1. Introduction

Anthropometry (Gr: anthropos – human & metron-measure) refers to measurement of human individual, that includes various number of parameters of various portions of human body. It involves collecting data on size, proportions of body parts and comparison of these findings in normal and abnormal individuals. Few eg. Of these parameters are – Height, hand length, foot length, ear length, etc.¹

One of the most important parameters in medico-legal investigations is estimation of stature which helps in identification of individual, it is very important tool in cases where only fragments or damaged remnants of unidentified persons are available for identification in cases of mass disaster (bomb blasts, train / plane crash, flood, cyclones, wars, earthquakes, etc.)

Determining stature includes several factors such as environmental and genetic,² due to biological variability

characteristics of population differ across world . India has population of ~1.3 billion which includes various racial and ethnic groups.

Accuracy in stature estimation can be influenced to some extent by specificity of sample, formula of one population should not be applied to different population. So, aim of this study is to derive regression equation formula to show relationship between height of individual and hand length of healthy adult of both sexes in central India population.

2. Materials and Methods

The study was conducted on 159 adults (19-26 years of age), in Department of Forensic Medicine & Toxicology, Chirayu Medical College & Hospitals, Bhopal, MP. Healthy, well nourished individuals were chosen who were not suffering from any bony disease/ deformity or congenital abnormality.

Prior permission's were taken from Institutional ethics Committee and written informed consent from all subjects were taken prior to data collection .Height and hand length were measured using measuring tape , sex and age were

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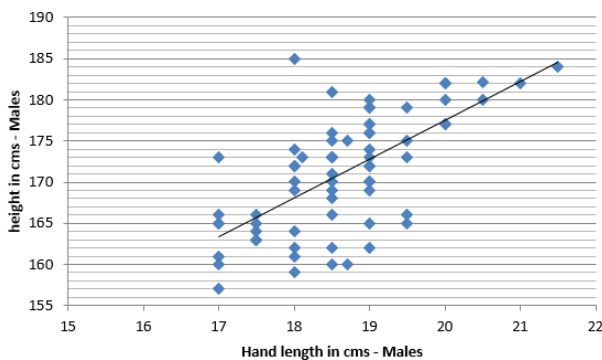
noted . Height was measured from vertex to heel in cms and hand length was measured from tip of middle finger till proximal crease of wrist.

The data collected was calculated to get mean value, SD and statistical analysis was done through t-test. Linear regression equation was derived using SPSS 23 software.

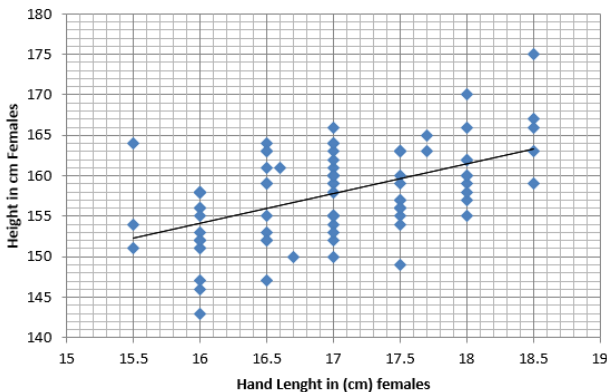
3. Results

Graphs 1 and 2 shows linear correlation between height and hand length. Pearson correlation coefficient found significant at P value – 0.01 (P value <0.05) between height and hand length, as height is increasing hand length is increasing.

Value for Pearson correlation coefficient in Males – 0.68 and Females – 0.52



Graph 1:



Graph 2:

The regression equation for finding stature from hand length is $Y = a+bx$

Males: $Y= 76.936 + 5.050 (x)$

Females: $Y= 94.815+3.706 (x)$

Y = expected height (cms)

x = hand length in cms

a and b are constant; Males a – 76.936, b – 5.050, Females a- 94.815, b – 3.706,

4. Discussion

As there is increase in cases of mass disasters involving explosions, suicide bombing, plane/ railway crash’s, mutilation of body after crime (homicide/sexual assault), in such cases many times body part is brought to forensic experts to establish identity (stature, sex) of individual.³ The regression equation will be useful in getting estimate of height. The aim of this study was to evaluate the accuracy and reliability of using hand measurement to estimate status.

Regression equation of Sunil et al can estimate stature within error of 4.0-4.6 cms,¹ our study has separate regression equation for males and females with SD of 4.97 cm and 2.91 cm.

Palimar et al equation was based on data collected during post mortem,⁴ Krishan et al regression formula was different from ours as they did study on North Indian population⁵ and ours study is conducted on Central India Population.

Multiplication factors are different from previous studies conducted because of genetic and geographical variations.⁵

The mean stature and hand length in males was 170.976cms & 18.62 cms, and females 157.762 cms & 16.985 cms respectively, the difference between height and hand length (Males > females) were similar with previous studies done by, Sanli et al,⁶ Supare et al,⁷ Lukpata et al.² Variance and SD were found to be lesser in females than in males .

5. Conclusion

Stature estimation of individual is a important parameter for establishment of identity. This study will be useful in estimating the height of individual from hand length and also shows a reliable correlation between height and hand length. The study can be further explored by growing sample size and widen geographic region.

6. Acknowledgements

We are grateful to all study participants for their cooperation, we also express our gratitude to the Department of Forensic Medicine & Toxicology for supporting the study.

7. Conflict of Interest

None.

8. Source of Funding

None.

Table 1: The mean and range of data collected are shown in Table no.1 (N=159)

Table 1	Range		Mean with SD	
	Male	Female	Male	Female
Age (years)	19-26	19-23	21.22 ± 1.30	20.85± 0.97
Height (cms)	157-186	143-175	170.976± 7.310	157.762± 5.60
Hand length (cms)	17-21.5	15.5-18.5	18.602± 0.964	16.985± 0.785

Table 2: Predicted values of height (cms) after using regression equation shown in Table 2

Table 2	Minimum	Maximum	Mean	SD	N
Males	162.794	185.521	170.976	4.97	75
Females	152.260	163.378	157.762	2.911	84

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Cite this article: Parashar R, Paliwal S, Jain AK. Estimation of stature from hand length of an individual in central India population. *IP Int J Forensic Med Toxicol Sci* 2020;5(4):135-137.