

# Estimation of Height from Length of Fingers in Humans

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**Abstract:-** In mass casualties, commingling, mutilations, or sunder of organs in natural calamities, murders, or accidents it is difficult to identify the individuals. Therefore, identifying and determining the stature of a person from the obtained evidence is a task for forensic sciences. There is a constant relation between every body part and the height of a person. Research on relationships between different parts such as foot length etc has been done, but not much data has been collected so far for defining the relation of all the finger lengths and heights. Hence this project/survey was undertaken in which measurements of finger length of both left and right hands along with the height of the individual were collected. About 150 samples of different heights and age groups were gathered. Using statistical data, a mathematical formula was derived. In the end, we can infer that the height of an individual can be determined by its finger length with great precision.

**Keywords:-** Stature, Finger Length, Mutilations.

## I. INTRODUCTION

With the increasing frequency of crimes, commingling, mass casualties such as terrorist attacks, plane crashes, gas leaks, and natural disasters (Gloria Christal *et al* ....2018). Many a time the body retrieved from such scenes is in a dismembered or in destroyed state (Trishna Priya Devi *et al* ....2021) . In mutilations cutting of organs with machinery or manually on crime scenes can be seen(Trishna Priya Devi *et al* ....2021) . Identification of such individuals has become difficult for forensic science (Anke Klein *et al* ....2015) . Therefore gender, height, and age at the time of death are some factors to be estimated from the obtained fragmented body (Anke Klein *et al* ....2015). Forensic anthropology uses various methods to find these biological factors (Trishna Priya Devi *et al* ....2021). Biological profiles such as human stature can be used to identify (Gloria Christal *et al* ....2018). There is a constant relationship between every body part and the height of a person (Gloria Christal *et al* ....2018). Nowadays the method of determining stature gives more prominence to the skeletal bones of the body making it a long and time-consuming process(Trishna Priya Devi *et al* ....2021). So far

research has been done on various parts of the body such as foot length, and many skeletal bones for example femur and Tibia, etc even with the palm, ring finger, and middle finger. Considerably less research is done on finger lengths and height relation (Gloria Christal *et al* ....2018). Hence this survey was conducted. From the state of Maharashtra, samples of 150 individuals of different heights and ages were collected. Using R- software the data was analyzed. Pearson correlation coefficient was obtained, and graphs were plotted. In the end, we can infer that the height of an individual can be determined by its finger length with great precision. Anthropology is the study of cultures and human society but physical anthropology deals with physiological characters and the human body. The performed research can be also utilized by anthropologists (Gloria Christal *et al* ....2018).

### ➤ Objectives

- To estimate the relationship between stature and finger length.
- To discover the best fingers eligible for the estimation of stature.

## II. METHODOLOGY

The observational and statistical study was carried out on samples of over 150 subjects of Indian Origin located in Maharashtra western part of India. Out of the 150 subjects, approx. 75 were male and 75 were female falling in the age group of 18 to 60. Data was collected on their age, sex, and height with their anthropometric measurements. The stature was measured using a measuring tape for every individual. A Vernier caliper was used to measure the finger length. The length of all fingers and both the right and left hands of males and females were measured. Subjects with injured fingers, additional fingers, missing fingers, amputated fingers, or any other abnormalities were not considered. The data was transferred on an Excel sheet. R-software was used for further analysis. A Pearson Collateral coefficient was obtained using R-software. After this Collateral Matrix graphs were plotted.



Fig 1 Vernier Caliper used

**III. RESULT AND DISCUSSION**

On average, it was observed that the finger length of males was greater than that of females. Data gathered from 150 subjects were statistically analyzed using R- software the Pearson correlation coefficient was obtained. The values of the Pearson correlation coefficient can be observed in Tables 1 and 2. The positive values of the Pearson collateral coefficient signify that there is a correlation between the height of a person and its finger length. From the Pearson

correlation coefficient of both the right and left hands of males and females, it can be deduced that mainly the length of the right hand's middle finger is the most significant and reliable quantity in determining the height of an individual. The right-hand ring finger and left-hand middle finger can be considered if the right-hand middle finger is not available. It can also be interpreted that the length of the thumb and index fingers are least reliable quantities for finding the stature.

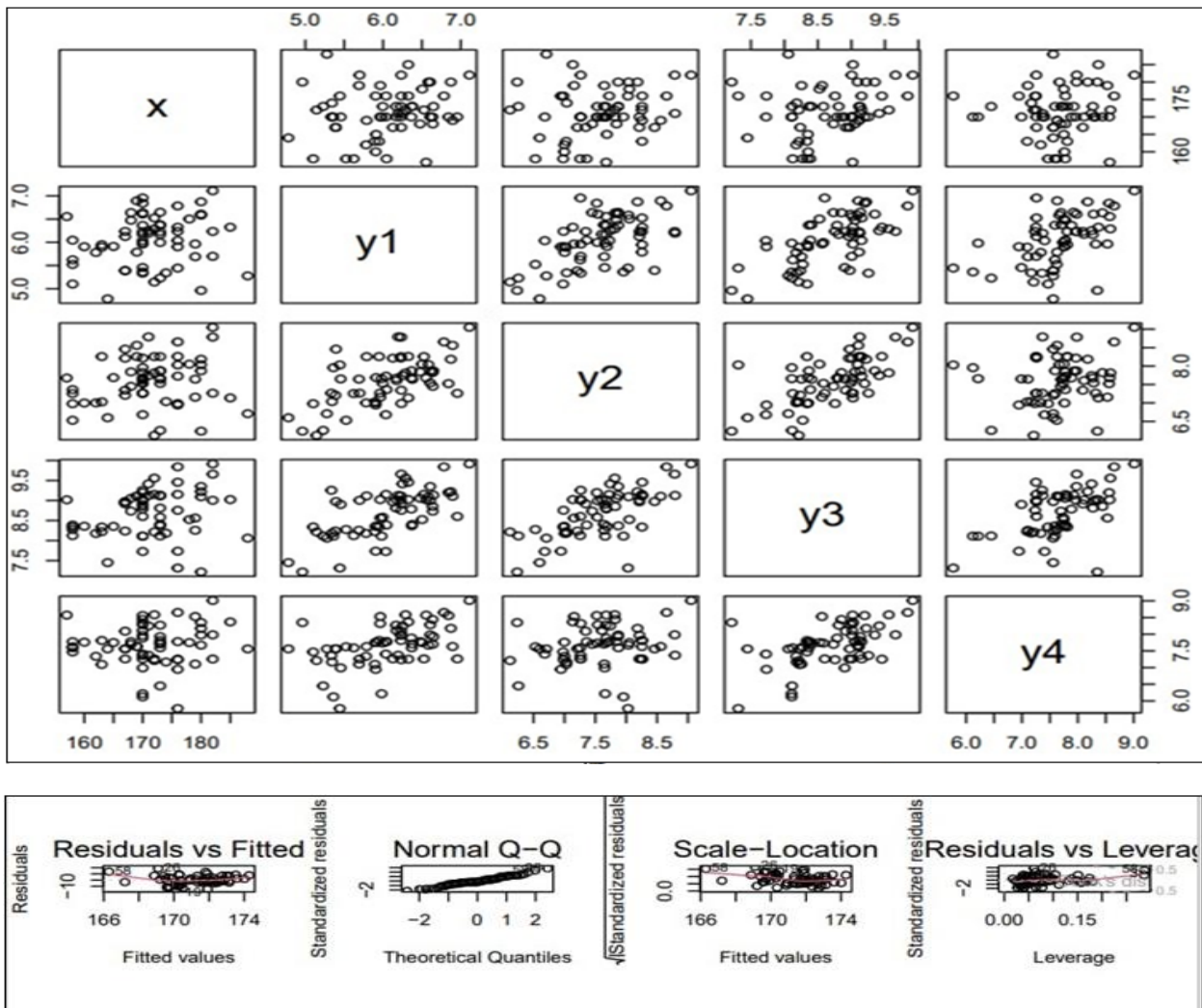


Fig 2 Co-Relation Matrix of Right-Hand Males

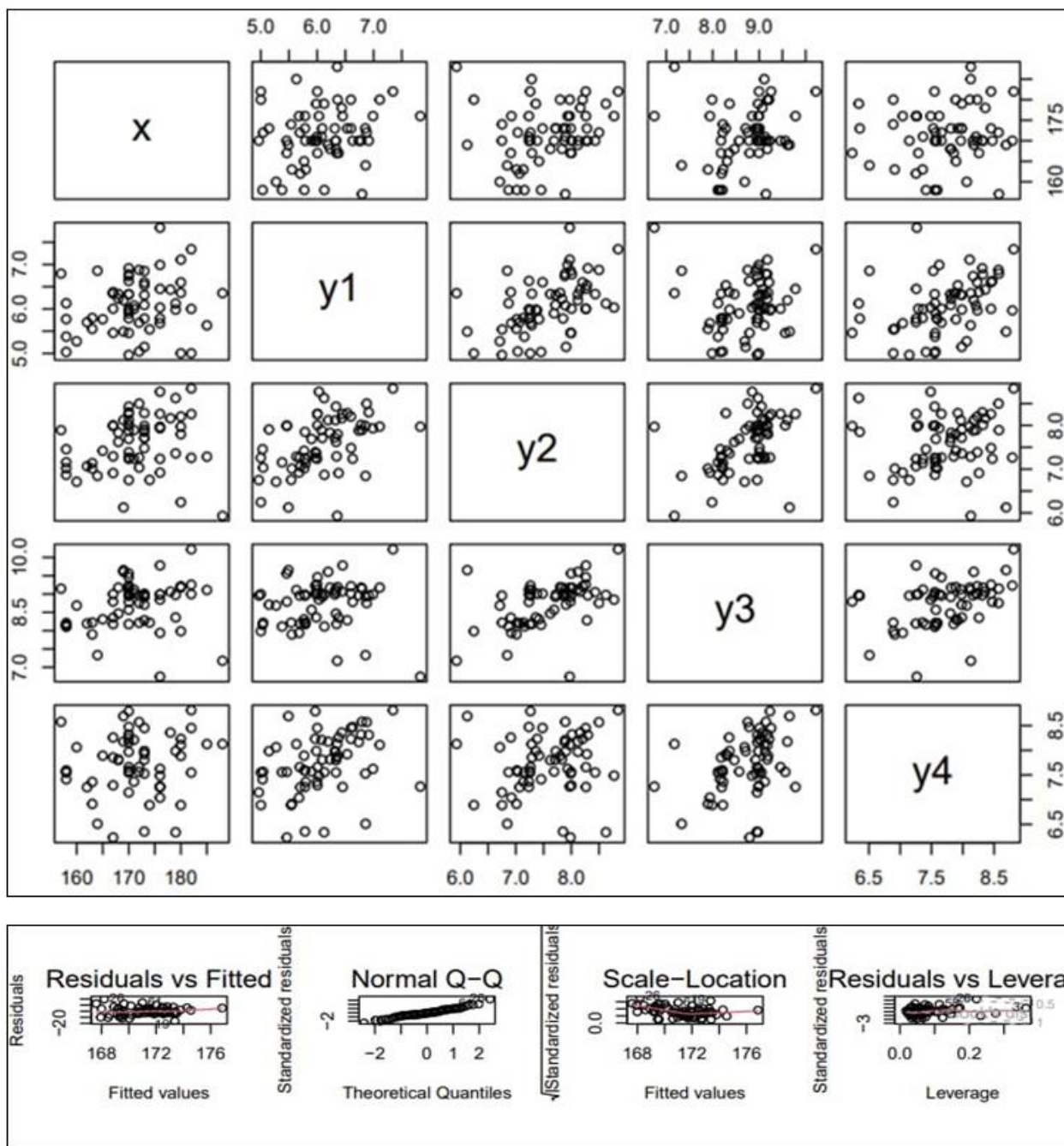


Fig 3 Co-Relation Matrix of Left- Hand Males

Table 1 Findings for Males

Sr No.	Right Hand	Pearson Correlation Coefficient	Left Hand	Pearson Correlation Coefficient
1	Little Finger	0.1788	Little Finger	0.1915
2	Ring Finger	0.1671	Ring Finger	0.1934
3	Middle Finger	0.2150	Middle Finger	0.1999
4	Index Finger	0.0824	Index Finger	0.1110
5	Thumb	0.0404	Thumb	0.1327

Table 2 Findings for Females

Sr No.	Right Hand	Pearson Correlation Coefficient	Left Hand	Pearson Correlation Coefficient
1	Little Finger	0.0424	Little Finger	0.0069
2	Ring Finger	0.010	Ring Finger	0.0159
3	Middle Finger	0.070	Middle Finger	0.1295
4	Index Finger	0.1367	Index Finger	0.1030
5	Thumb	0.2183	Thumb	0.1177

**REFERENCES**

- [1]. Anke Klein, Katrin Nagel, Julian Gührs, Chanasorn Poodendaen, Klaus Püschel, Michael M. Morlock, Gerd Huber, On the relationship between stature and anthropometric measurements of lumbar vertebrae, *Science & Justice*, Volume 55, Issue 6, 2015, <https://doi.org/10.1016/j.scijus.2015.05.004>.
- [2]. Gloria Christal, Prajakta Manve, Pooja Ahuja and MS Dahiya. Estimation of Stature from Finger Length. *J Forensic Sci & Criminal Invest.* 2018; 7(2): 555709. DOI:10.19080/JFSCI.2018.07.555709
- [3]. Trishna Priya Devi, Praveen Kumar, Kumar Pinku Pratim, Lalit P. Chandravanshi, Monika Chauhan, Estimation of Stature from foot length in male indigenous population of Assam Region, *The Foot*, Volume 49, 2021, <https://doi.org/10.1016/j.foot.2021.101840>.
- [4]. Kewal Krishan, Tanuj Kanchan, Ningthoukhongjam Asha, Estimation of stature from index and ring finger length in a North Indian adolescent population, *Journal of Forensic and Legal Medicine*, Volume 19, Issue 5, 2012, Pages 285-290, ISSN 1752-928X, <https://doi.org/10.1016/j.jflm.2011.12.036>.
- [5]. Abdi Özaslan, M.Yaşar İşcan, İnci Özaslan, Harun Tuğcu, Sermet Koç, Estimation of stature from body parts, *Forensic Science International*, Volume 132, Issue 1, 2003, Pages 40-45, ISSN 0379-0738, [https://doi.org/10.1016/S0379-0738\(02\)00425-5](https://doi.org/10.1016/S0379-0738(02)00425-5).
- [6]. D.P. Bhatnagar, S.P. Thapar, M.K. Batish, Identification of personal height from the somatometry of the hand in Punjabi males, *Forensic Science International*, Volume 24, Issue 2, 1984, Pages 137-141, ISSN 0379-0738, [https://doi.org/10.1016/0379-0738\(84\)90093-8](https://doi.org/10.1016/0379-0738(84)90093-8).
- [7]. MATOVINOVIĆ M, GRADIŠER M, SINDIK J, ŠARAC J, AUGUŠTIN DH, HODŽIĆ RM, NOVOKMETN, MISSONI S, 2023:
- [8]. ANTHROPOMETRIC CHARACTERIZATION OF PATIENTS WITH ACROMEGALY IN CROATIA – ESTIMATING STATURE FROM HAND LENGTH. *Anthropologie (Brno)* 61, 2: 181-189. <https://doi.org/10.26720/anthro.23.04.21.2>