ESTIMATION OF STATURE OF MEDICAL STUDENTS FROM COMBINED LENGTH OF FOREARM AND HAND IN TERTIARY CARE HOSPITAL OF NORTH INDIA

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Abstract
Identifying an individual is an important part of Forensic Medicine. The stature of an individual can be very helpful in identification of that individual. If whole of the body or skeleton is available with us, we can easily tell about the stature of the individual. However, it becomes a difficult process if only a part of body or mutilated body is brought for examination. Stature of body bears relation with almost all of the body parts. By using some multiplication factors and formulas, stature of the individual can be estimated easily even if only a part of body is brought for examination. This study was carried out on 120 medical students of a tertiary care institute of Himachal Pradesh to determine the relationship of the combined length of forearm and hand with the stature..

Keywords: Identification, Stature, Mutilated body

Introduction

Identification is an important part of Forensic Medicine. Identifying an individual is very easy in a case where whole body is brought to us. Many parameters helps to identify an individual e.g. Name, Age, Sex, Stature, Fingerprints, DNA profiling, Tattoo marks etc. A body can be easily identified by assesing the clothing, body built, stature, identity cards, tattoo marks etc. However in case, if, only a part of body is recovered, or the body is in advanced stage of decomposition, or the body is mutilated, identification becomes a cumbersome process. The stature of the person can be of a great help to the forensic pathologist in identifying a person. Almost every body part bears a relation with the stature of an individual. Thus, by using some formulas and mutiplication factors, the stature can be calculated from a body part.

Relationship between different body segments with the whole body, especially from dimensional point of view have been of interest to artist, anatomist, scientist, architecture & medicologist since long time [1]. Recent studies have observed differential limb proportions between two sexes and among different populations. For example, Negros has relatively long arms and legs [2]. Therefore we need different formulas and equations for different population.

This study is conducted on medical students of a tertiary care hospital of Northern India to establish the relation between combined length of forearm and hand with the stature and to derive a regression equation to calculate the stature from the combined length of forearm and hand.

MATERIALS AND METHODS:

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This study was conduct on the medical students of a tertiary care institute of Himachal Pradesh to establish a relationship between length of forearm and stature of medical students and to derive a regression equation between the combined length of forearm and hand and stature. This study was performed on 120 medical students (males & females) of age group between 18-23 year.

Stature: Maximum distance from vertex to floor, maintaining the anatomical position and Frankfurt plane.
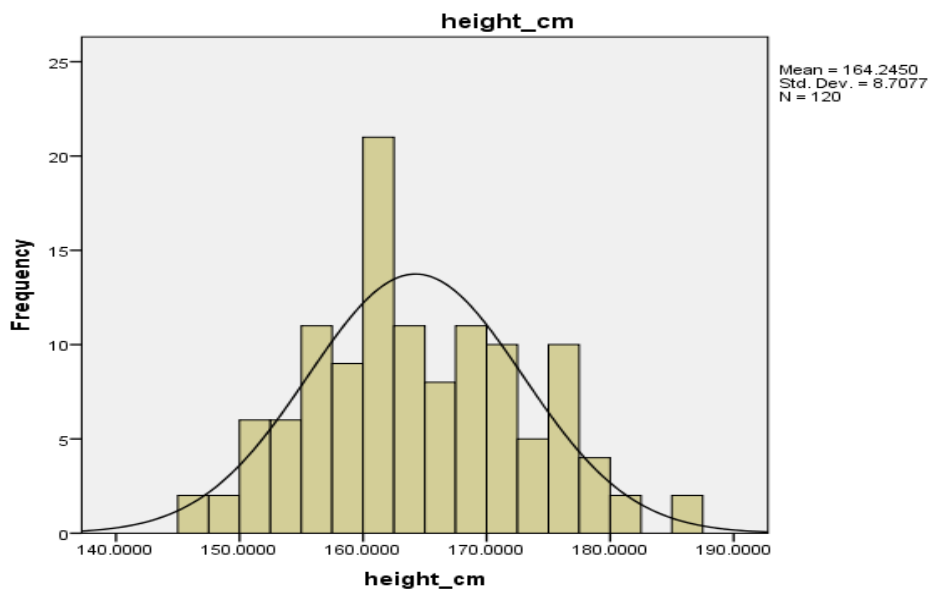
Combined length of Forearm and Hand: From tip of olecranon process to the tip of middle finger using a standard measuring tape.

STATISTICAL ANALYSIS:

The primary outcome is to establish a relation between stature of medical students from combined length of forearm and hand in tertiary care hospital of north india. The data is analysed using SPSS (version 16.0.2).

Table 1: Summary of study participants in terms of age, height, right forearm length and left forearm length:

Indicator	All participants	Female	Male
Total Participants (N)	120	70 (58.3%)	50 (41.7%)
Height in cm (Range)	147- 185	147-174	155-185
Mean Height (standard Deviation)	164.24 (8.70)	158.79 (5.64)	171.8 (6.13)
Right forearm length in centimeters (Range)	37.5- 51.10	37.5- 49.00	38.2-51.10
Mean Right forearm length (Standard Deviation)	43.6 (2.91)	42.04 (2.15)	45.85 (2.33)
Left forearm length in centimeters (Range)	37.6- 51.10	37.6- 48.7	38.4-51.1
Mean Left forearm length (Standard Deviation)	43.62 (2.92)	42.01 (2.14)	45.87 (2.31)
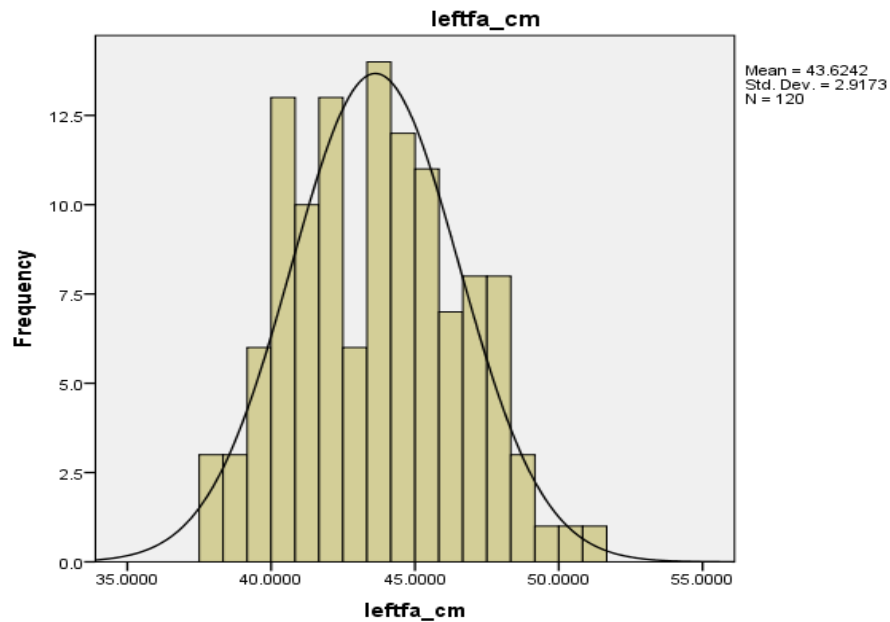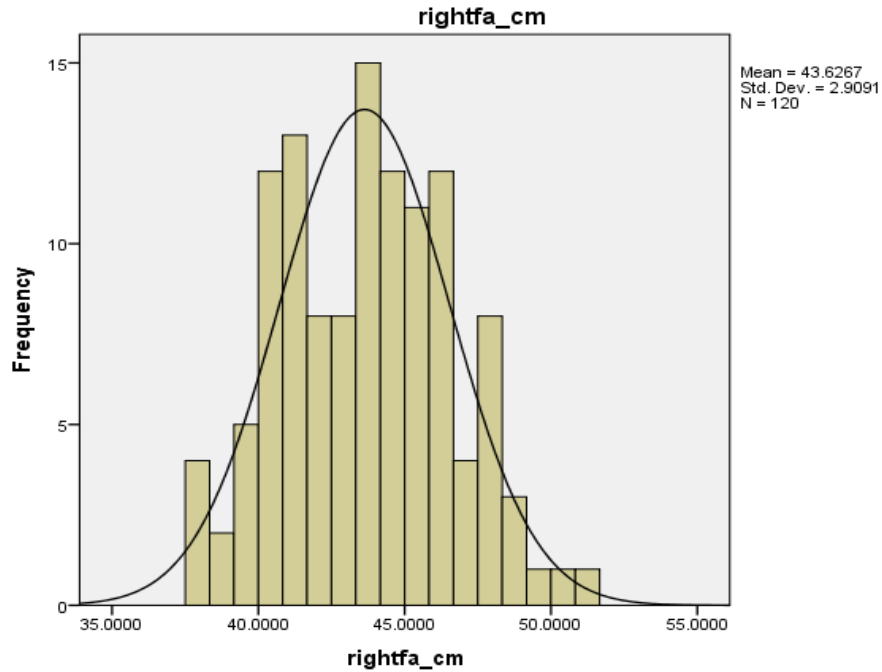
Results: There was significant positive correlation between combined length of forearm and hand and stature (r=0.894, p<0.01) in our study group (N=120). The correlation coefficient (r) between combined length of right forearm and hand and stature was found to be 0.893 (p<0.01); between combined length of left forearm and hand and stature was 0.894 (p<0.01) for all participants (N=120). Among female participants (N=70) the correlation coefficient (r) between combined length of right forearm and hand and stature was calculated as 0.741; between combined length of left forearm and hand and stature as 0.737 and both were found significant (p<0.01). Among male participants (N=50) the correlation coefficient (r) between combined length of right forearm and hand and stature was calculated as 0.885; between combined length of left forearm and hand and stature as 0.887 and both were found significant (p<0.01).

Regression equations to estimate stature in centimeters (y) given combined length of forearm

and hand in centimeters (x) were calculated as follows:

1) y (cm) = 47.66 + 2.67* Mean combined length of forearm and hand (cm) for all participants

2) y (cm) = 47.69 + 2.67* combined length of right forearm and hand (cm) for all participants

3) y (cm) = 47.88 + 2.67* combined length of left forearm and hand (cm) for all participants

4) y (cm) = 65.16 + 2.33* combined length of right forearm and hand (cm) for Males

5) y (cm) = 63.87 + 2.35* combined length of left forearm and hand(cm) for Males

6) y (cm) = 76.97+ 1.95* combined length of right forearm and hand (cm) for Females

7) y (cm) = 77.32+ 1.94* combined length of left forearm and hand (cm) for Females

DISCUSSION:

Estimation of stature of an individual plays an important role in the identification of that individual. However, when a body is mutilated, fragmented or when only a part of body is available for examination, it becomes difficult to estimate the stature of the individual. Many regression equations has been devised in order to estimate the stature of the individual from the length of a body part.

Choudhary S et al conducted a simliar study to generate formula for estimation of stature from combined length of forearm and hand in Jammu region of India [3]. Results of the study revealed highly significant gender differences between the selected parameters necessitating the need for separate data for two sexes. A positive and significant correlation coefficient of 0.615 and 0.731 was observed in the males and females in the their study. The findings are consistent with our study.

Potdar AB et al conducted a study on 200 medical students as subjects, to know co-relation between stature and forearm length [4]. It was found that there is positive co-relation between forearm length and stature (r=0.83) and it is statistically significant. Regression equation was derived to estimate stature from forearm length which is Y=3.97X+63.67 for overall study population, while for only male subjects

it was Y=2.66X+100.87 and for females it was Y=3.28X+78.53. The study is consistent with our study.

Panjakash S et al. conducted a study to examine the relationship between the stature and right forearm length of 100 males and 100 females of north Karnataka, population in age ranging from 21 to 35 years [5]. Linear and multiple regression equations formula for stature estimation were calculated. The co-relation co-efficient between stature and both right and left forearm length were found to be positive and statistically significant (*P*<0.01). The highest co-relation co-efficient is +0.65 for left forearm length. The study in consistent with our study.

Balachandran M, Vaswani VR conducted a study and moderate correlation was found between right forearm length and Height and this correlation is highly statistically significant. There was also a moderate correlation between Left forearm length and Height and this correlation was also highly statistically significant [6]. This study is also consistent with our study.

Dongre SS et al. conducted a study on 255 participants including 54 (21.18%) males and 201 (78.82%) females. Regression equation for estimation of stature from right forearm length is S = 1.4111 Rt FAL+ 126.72, and from left forearm length is S = 1.3774 Lt FAL+ 128.39. There were strong positive correlations between height and forearm lengths in all regressions (r >0.9; p < 0.0001), which is consistent with our study.

Patil SM conducted a similar study on 200 1st M.B.B.S. students of Rajarshee Chhatrapati Shahu Maharaj Government Medical College, Kolhapur. The correlation coefficient was found 0.8146 for forearm length with stature in males and in female, it was 0.6985 and a good correlation between forearm length and stature was observed, which is consistent with our study.

CONCLUSION:

We conducted this study on 120 Medical Students of age ranging from 18-23 years. The main purpose of this study was to find the relation between the stature and combined length of forearm and hand. The correlation coefficient and regression equation is devised to establish this relationship. We found that a strong relation exist between the combined length of

forearm and hand with stature (p<0.01). The regression equation obtained after analysing the data can be of great help in identification of the individual by calculating the stature. Even if only forearm of a person is found, as in cases of mutilated bodies, fragmented bodies, we can help to determine the stature by using the regression equation and thus identifying the individual.

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