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Estimation of stature from arm span measurement in Haryana region

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Abstract

Due to some condition we cannot measure physical stature of individual; in those cases we can measure a body part to estimate stature. This study determines that from arm span length we can reliably estimate stature. The cross sectional study of 145 individuals (80 males and 65 females) to find the relation between percutaneous arm span length and stature along with multiplication factor to reconstruct the stature. The correlation coefficient between height and arm span length was found to be positive. Regression equations between height and arm span

length were derived from obtained data. Stature can be reliably estimated from the arm span length.

Keywords: Stature, arm span length, mean, Haryana, Anthropology, Correlation

Introduction

Height can be estimated effectively from various body parameters. Estimation of stature from different part of body not only required for fragmented or mutilated bodies but also predicting the age-related loss in stature, identifying individuals with disproportionate growth abnormalities, skeletal dysplasia or height loss during surgical procedures on the spine. Due to strong influence of genetic and environmental factors, the relation between arm span and stature is found to vary from race to race. To date, no study has been conducted for estimation of stature from arm span length using regression equation for the Haryanavi population. Therefore, aim of the present study was to derive the regression equation between stature and arm span length for Haryanavi population.

Material and method

The cross sectional study was conducted in tertiary medical college at Rohtak on 145 healthy medical students in Department of Forensic Medicine, PGIMS, Rohtak during January to March 2013, Out of which 80 were males and 65 were females. Their age ranged between 18 to 25 years. Necessary permission was taken from institute. In afternoon from 2.00 to 4.30 p.m. all the observations were recorded in centimeters (cm) and by the same person to avoid personal error in methodology. The stature and arm span was measured in all the subjects.

Stature (S): It is obtained when the subject is standing in the standard standing position i.e head touch the wall and heels were together then the distance between the highest point on the head (vertex) and the standing surface were measured using anthropometer.

Arm span(AS) :- It was obtained when the individual standing with their back to the wall with both arms abducted to 90°, elbows and wrists extended and the palms facing directly forward then with help of a flexible steel tape from the tip of the middle finger of one hand to the

tip of the middle finger of the other hand, arm span distance was measured. Readings were taken to the nearest 0.1 cm.

Inclusion Criteria

- All measurements were made carefully.
- Measurements were taken twice in each subject.

Exclusion Criteria

- Subjects with injuries or any bony deformities were excluded from the study

Statistical Analysis

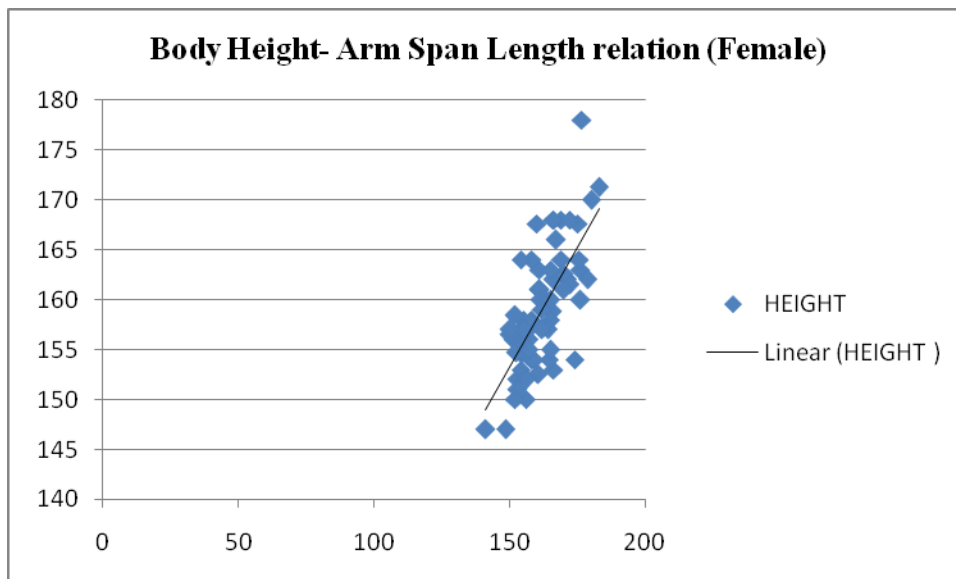
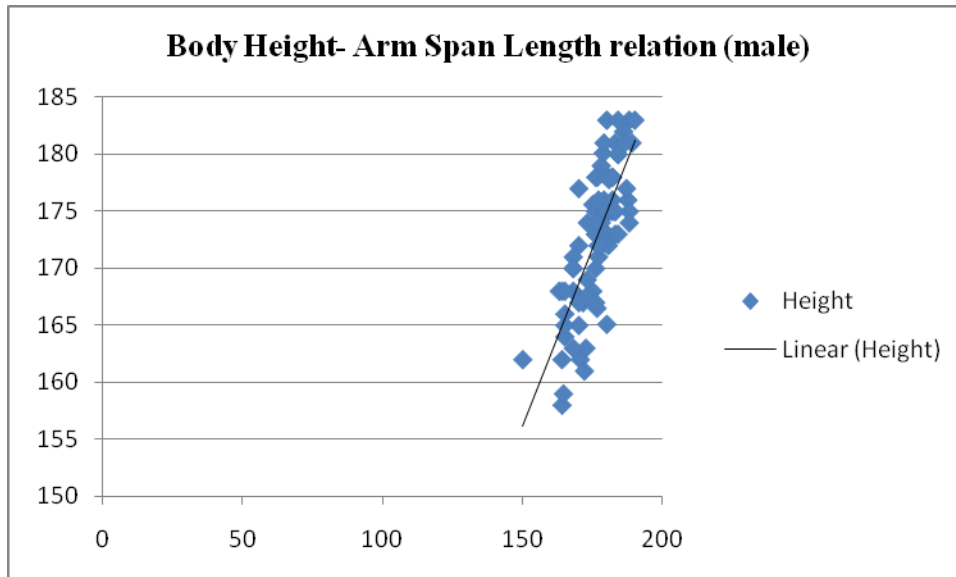
The data thus obtained was used to statistical calculations using Excel and SPSS computer programmer to obtain the regression equation for estimation of stature using arm span length.

Result

Data of volunteers were analyzed in the current study. Table 1 shows Mean Height, Mean arm span length, correlation coefficient®, regression coefficient (b) and value of constant (a) in 80 Males and 65 Females. (table 1).

Table -1: shows Data in different value in Males and Females.

Parameters	Male	Female
Total Number	80	65
Mean height (cm)	172.75	159.10
S.D. of height	6.111	6.048
Mean Arm span length (cm)	176.44875	162.1046154
S.D. of Arm span length	7.595001583	8.802297832
Correlation Coefficient(r) (Height and Arm span Length)	0.768369006	0.700928134



In the present study the regression formula is derived as under. The linear regression equations which were derived for estimation of statures from Arm span length (TL) in both males and females are given in table 2.

Table -2: Regression formula from arm span length for estimation of stature for males and females.

Regression equation from arm span length in males

$$\text{Height} = 0.624 \times \text{AS} + 62.47 \quad R^2 = 0.590$$

*** AS-Arm span length**

Regression equation from arm span length in females

$$\text{Height} = 0.481 \times \text{AS} + 81.03 \quad R^2 = 0.491$$

*** AS-Arm span length**

DISSCUSION

The correlation coefficient between height and arm span length is +0.77 in male and +0.70 in female which is significant with statistical significance of 0.001 in males and 0.001 in females. It means there is a strong correlation between height and arm span length and if either of the measurement (arm span length or total height) is known as we observed in following studies.

In 2011 a study was carried out to derive correlation and multiplication factor for estimating stature using arm span in total number of 100 Christian Garo adult female aged between 25 to 45 years. Significant positive correlation was found in case of arm-span with the stature ($r=0.89$) [1].

Ter Goon, D., et al. in cross-sectional study examined 306 (180 men and 126 women) healthy students between 20 and 49 years of age were measured in February 2009 to derive relationship between stature and arm span in Nigerian adults. Their study determined that arm span was a good predictor of stature for men and women. Regression equation for men was $\text{stature} = 67.63 + 0.577(\text{Arm span})$; $r = 0.77$ and women ($\text{stature} = 55.16 + 0.642(\text{Arm span})$; $r = 0.72$). The correlation between arm span and stature ($r = 0.82$; $p < 0.01$) was high and significant in all the age groups [2].

Shah et al conducted study on 150 M.B.B.S students (72 male and 78 female) in one of the medical college of Ahmedabad, India during August 2013 to November 2013 to obtain correlation and regression equation between height and arm span. Their data showed strong correlation between height and arm span. Regression equations derived from analysis of data were Male Stature= $159.5005 + (0.0934) \times \text{Armspan}$ in centimeters and Female Stature = $40.6058 + (0.7425) \times \text{Armspan}$ in centimeters [3].

Rai et al derived correlation coefficient between arm span and stature in 600 participants (300 males and 300 females) grouped in 3 different age groups i.e Group A (26-35 yr), Group B (36-45 yr), Group C (46-55). They obtained a positive correlation between the arm-span and stature in all the age groups [4].

Supare et al in their cross study conducted on 400 medical students (219 males and 181 females) of three Government medical colleges of Maharashtra, aged 18–24 years to derive correlation between stature and arm span. Strong correlation between stature and AS was observed, Coefficient (R) of 0.89 in male and 0.90 in female [5].

Conclusions

Like all the other studies, our study also showed strong correlation exists between arm span and stature. Mean stature and arm span of male were more than female with statistical significance. Stature can be accurately estimated from arm span by using simple regression equation or multiplication factor. It has been observed that stature can be estimated from the arm span length to be used as predictive values for medicolegal purposes.

Conflict of Interest

None Declared.

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Authors Column



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