

Original article

Estimation of stature from hand length and breadth-An anthropometric study on adult Bangladeshi women

Khushruba Rahman Khan¹, Farhana Akter², Md Razaul Huq³, Laila Farzana Khan⁴, Humaira Naushaba⁵

¹Senior Lecturer, Department of Anatomy, Dhaka National Medical College, Dhaka, ²Lecturer, Department of Anatomy, Dhaka National Medical College, Dhaka, ³Senior Medical Officer, Department of Skin and VD, Dhaka National Medical College Dhaka, ⁴Senior Lecturer, Department of Anatomy, Dhaka National Medical College, Dhaka, ⁵Professor and Head, Department of Anatomy, Sir Salimullah Medical College, Dhaka,

Abstract:

The upper limb is unique both structurally and functionally. It is the most movable part and main working tools of human body. It is used for maintaining balance, carrying, touching, cognition, holding, gripping and for performing various fine works. The study also aimed to provide knowledge to anatomists, forensic scientists, biologists, plastic surgeons, radiologists, archaeologists, anthropologists, nutritionists and beauticians and to grow interest among the researcher for future study and to compare the data with the data of the people of other countries. This is descriptive and analytical type of study which was carried out in the department of Anatomy, Sir Salimullah Medical College, Dhaka from July 2010 to December 2011. The number of subject was 100 right handed adult Bangladeshi women belonging to age group of 25 to 45 years. Hand length and breadth along with stature were measured directly from the subjects by using anthropometric sliding caliper. The data were then statistically analyzed by computation to find out its normative value. Regression analysis were done to see the correlation between stature and these variables.

Key words: Anthropometry, hand length, stature

Introduction:

Anthropometry, literally meaning "measurement of humans", refers to the measurement of the human individual for the purposes of understanding human physical variations¹. Anthropometry is the science that deals with the measurement of size, weight and proportion of the human body. This was adapted by medical scientists to estimate the body size for over a hundred years¹⁵. It is used to assess health, survival of individuals and reflect the economic and social well being of populations. Anthropometry is a widely used, inexpensive and non-invasive measure of the general nutritional status of an individual or a population group⁴. The study is aimed to provide knowledge to Anatomist, Anthropologists Forensic scientist, Plastic Surgeons Radiologists, Archeologists and Nutritionist and to grow interest among the researchers for future study.

Materials & Methods:

The study was a descriptive and analytical type. This study was carried out on 100 adult Bangladeshi women in the Department of Anatomy, Sir Salimullah Medical College (SSMC), Dhaka and was conducted from July 2010 to December 2011. To measure the stature the subject was said to stand with her heel together and her back as straight as possible so that her heels, buttocks, shoulders and the head pressed against the upright position of the instrument. The arms were hung freely by the sides with the palm facing the thighs. The subject's head was positioned in the Frankfort horizontal plane, and the head plate was brought in contact with vertex in the mid saggital plane and then readings were taken to the nearest 0.1 cm¹⁷. Length of the hand was measured by sliding caliper. She was asked to place her hand on a table with the fingers together and thumb abducted (Figure 1). The measurement was taken from the distal wrist crease to the tip of the middle finger⁹. The value was recorded

in centimeters to the nearest 0.1 centimeters. Breadth of the hand of the subject was measured by sliding caliper. She was asked to place her hand on a table with her fingers together and thumb abducted (Figure 2). The measurement was taken at the knuckles from metacarpal II to metacarpal V⁹.

Regression formula is used for estimation of the stature from anthropometric measurements of body:

Stature = value of constant + regression coefficient x variable.

Value of the constant and the regression coefficient for each variable was calculated using SPSS version 16.0 program.

Data processing and analysis:

The data were put into the computer. Then the data were analyzed with the help of SPSS version 16.0 for Windows program keeping in view the objective of the study. Pearson's correlation coefficient test was performed to measure the relationships between the variables and two-sample Z-test was performed to compare between means.

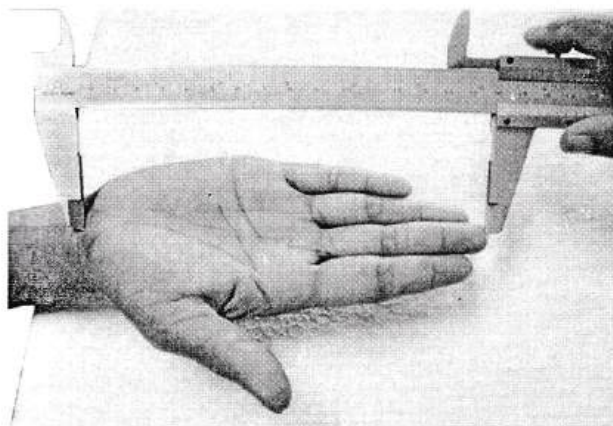


Fig:1 Procedure for measuring the length of hand

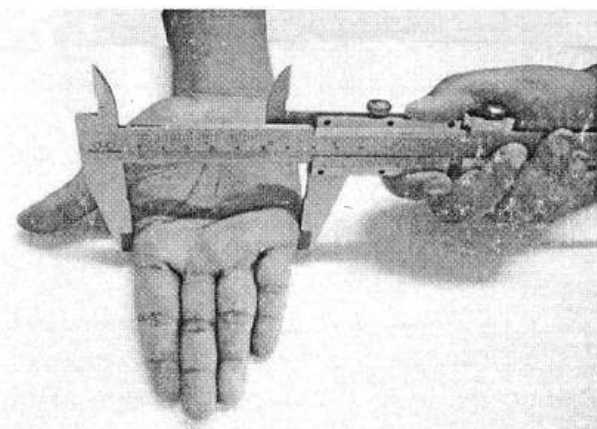


Fig:2 Procedure for measuring the breadth of hand

Result:

The mean (\pm SD) of the stature was found 149.61 \pm 5.07cm (Table 1& Fig 3). The length of the right hand varied from 15.35 to 18.95 centimeters as shown In Table 1. In more than 70% of the subjects, the length of the right hand was between 15.50 and 17.50 cm (Fig 4). The length of the left hand varied from 15.31 to 18.87 centimeters as shown in Table 1. In more than 70% of the subjects, length of the left hand was between 15.50 and 17.50 cm (Fig 5). The length of the right and left hand showed significant positive correlation ($r=0.493$, $p=0.000$ and $r=0.508$, $p=0.000$) with the stature. The breadth of the right hand varied from 6.91 to 8.13 centimeters as shown in Table 1. In more than 70% of the subjects, the breadth of the right hand was between 6.75 and 7.75 cm (Fig 6). The breadth of the left hand varied from 6.89 to 8.12 centimeters as shown in Table 1. In more than 75% of the subjects, breadth of the left hand was between 6.75 and 7.75 cm (Fig 7). The breadth of the right and left hand showed significant positive correlation ($r=0.469$, $p=0.000$ and $r=0.470$, $p=0.000$) with the stature. Table 2 shows the range and mean calculated stature (\pm SD) from physically measured different upper limb variables with their difference with the measured stature with level of significance, significance of difference was tested using the two sample Z test at 95% level of significance ($p=0.05$). No significant difference was found between the measured and calculated stature from length and breadth of hand (Table 1).

Table:1 Stature and various physically measured hand dimensions and relation of calculated stature with measured stature

Variables	Measurement	Calculated stature (cm)	Correlation with stature		Significance of difference between calculated & physically measured stature (z-value)		
			r	p			
stature	141-160	149.69 \pm 5.07					
Length of Hand	right	15.35-18.95	17.18 \pm 0.87	149.62 \pm 2.50	.493	.000(s)	0.000(NS)
	Left	15.13-18.87	17.11 \pm 0.87	149.56 \pm 2.57	.508	.000(s)	0.481(NS)
Breath of Hand	right	6.91-8.13	7.54 \pm 0.27	149.62 \pm 2.38	.470	.000(s)	0.002(NS)
	Left	6.89-8.12	7.50 \pm 0.27	149.63 \pm 2.39	.470	.000(s)	0.017(NS)

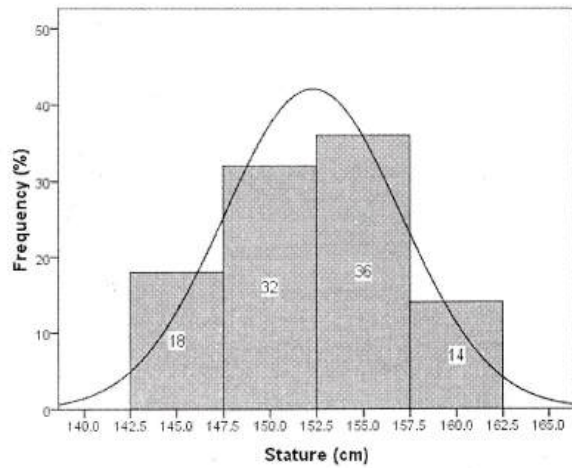


Fig. 3 Histogram showing the frequency distribution of stature (n=100)

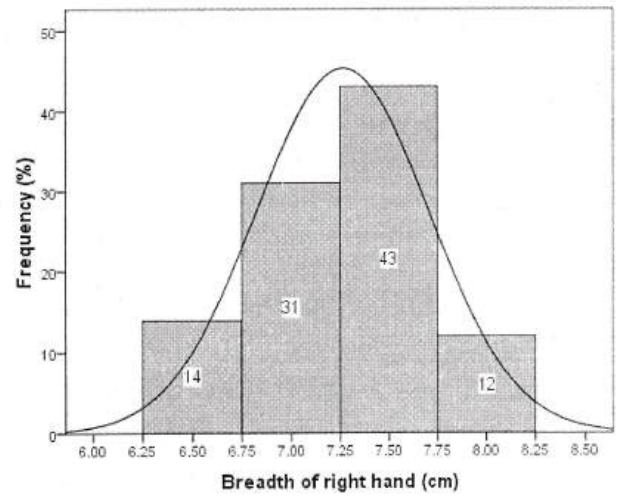


Fig. 6 Histogram showing the frequency distribution of breadth of right hand (n=100).

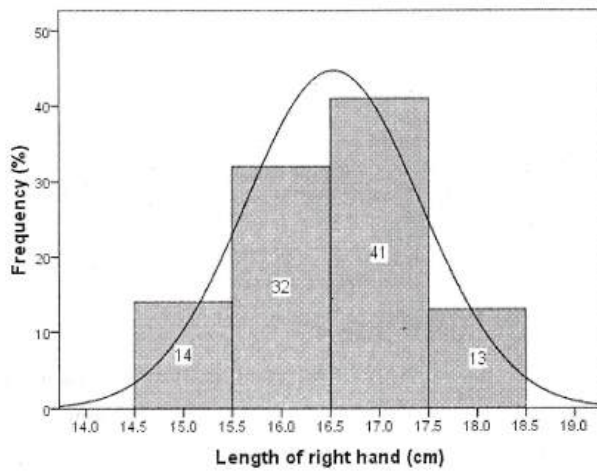


Fig. 4. Histogram showing the frequency distribution of length of right hand (n=100).

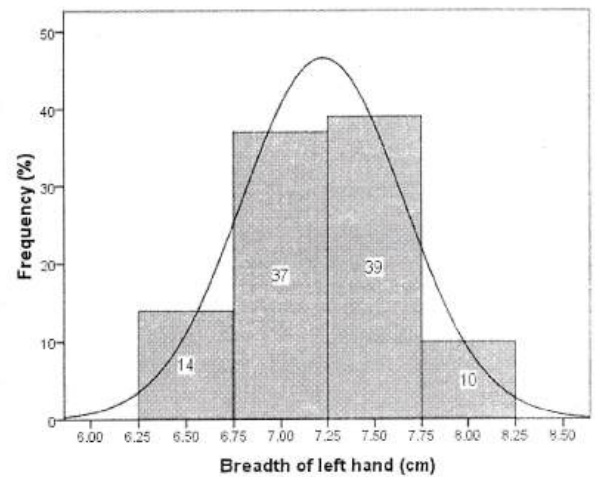


Fig. 7 Histogram showing the frequency distribution of breadth of left hand (n=100).

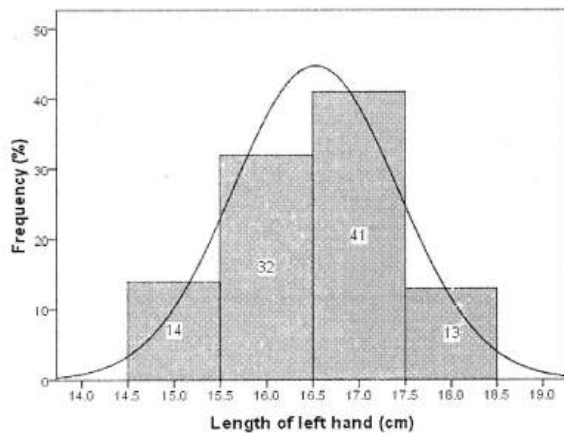


Fig. 5 Histogram showing the frequency distribution of length of left hand (n=100).

Discussion:

The study was designed to get normative values of the variables for the adult Bangladeshi women, to observe the possible correlation between hand length and breadth with the stature. The present study was compared with the women of Bangladesh, Gujarat, West Bengal, South India and North India, The mean (\pm SD) stature of the present study was similar to that of India¹³ and Malawi¹⁶. This might be due to similar food habits, The result of this study did not coincide with Ethiopians¹⁰, Punjabis of Punjab⁹, Jordanians of Jordan¹¹, Australians⁷, Indians⁶, South Indians¹², North Indians² and Americans¹⁷, where the mean (\pm SD) value of stature were

higher than the result of the present study. West Bengal⁵ had lower values than the present study.

The mean hand length and hand breadth of the people of Mauritius³ were similar, but the hand length of West Bengal Indian⁸ were higher than that of this study population. Hand length of Mengalore Indian¹⁴ coincided with the present study.

Conclusion:

This study provide the direction to construct baseline data of upper limb anthropometry of Bangladeshi people of different age groups and sexes. Hand length and hand breadth showed significant positive correlation with the stature. In Bangladesh stature estimation from hand length and breadth for personal identification is not established. If it is established in Bangladesh, it will become an important tool for forensic medicine department. It would also be useful in the field of anatomy, anthropology, archeology, ergonomics and nutritional science.

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