A MODEL FOR CONSTRUCTION OF STATURE FROM TRANS-TUBERCULAR BREADTH BY REGRESSION METHOD

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ABSTRACT

Stature is an important tool in the field of anthropometry and is of great scientific importance in the field of Medicine.

AIMS AND OBJECTIVES

To predict stature of an individual from trans-tubercular breadth and to derive a regression equations for estimation of stature in males and females.

MATERIAL AND METHODS

The present study was conducted on 150 male and 150 female, in the age group of 20-40 years. Stature of the subject was measured using anthropometer rod. Trans-tubercular breadth was measured with the help of spreading calliper.

RESULTS

Linear regression analysis was performed and regression equations for predicting stature from trans-tubercular breadth were derived. Correlation coefficient for predicting stature from trans-tubercular breadth were 0.31 and 0.27 in males and females respectively.

CONCLUSION

This study provides an additional tool of stature estimation particularly in absence of other measures.

KEYWORDS

Stature, Trans-Tubercular Breadth, Anthropometer Rod, Spreading Calliper.

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INTRODUCTION

Stature estimation is an important tool in the field of anthropometry. It can be used in the calculation of basal metabolic rate, body mass index, body surface area, vital capacity and for adjustment of drug dosages. It is also of great scientific importance in the field of forensic medicine. Estimation of stature from measurements like foot length and breadth, hand length and breadth and length of long bones have extensively been studied in different populations by different authors.^[1-4] but scanty literature is available for stature measurement from trans-tubercular breadth (TTB).^[5] Iliac tubercle is situated approximately 5 cm posterosuperior to anterior superior iliac spine on iliac crest.^[6] Trans-tubercular breadth is the distance between two tubercles of iliac crest. The present study was undertaken to estimate and evaluate possible correlation between stature of an individual and TTB in both, males and females.

MATERIAL AND METHODS

After getting permission from institutional ethical committee, the present study was conducted on 300 subjects (150 male and 150 female) in the age group of 20-40 year.

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Subjects were the consenting attendant of patients attending the outpatient department of the Hospital. Individuals with apparent physical deformity and growth and developmental defects were excluded from the study. The aims and objectives of the study and the procedures of examination were explained to the subjects in their own language and a written consent was obtained from them in predesigned and approved format. All measurements were taken after exposure of the relevant body parts in a separate room to maintain the dignity of the individual, in presence of male/female attendant, as the case may be. Stature was measured using anthropometer rod (Minimum count 1 mm) while trans-tubercular breadth was measured using round tipped spreading calliper (Minimum count 0.5 mm). The collected data was recorded and statistically analysed using "SPSS software version 20.0".

MEASUREMENTS

- Stature was measured by making the subject to stand bare footed on a horizontal platform in erect posture, keeping the head in Frankfort horizontal plane.^[7] It was measured as a vertical distance from the vertex of subject to the floor on which subject is standing. Movable horizontal piece of the anthropometer rod was brought in contact with the vertex in the mid sagittal plane and stature was recorded.
- TTB was measured by making the subject to stand erect after exposure of relevant body part and iliac tubercles on both sides were felt and marked on body surface with the help of a skin marking pencil. Measurement was taken by placing the round tipped spreading calliper on the marked points by standing in front of the subject.

OBSERVATIONS AND RESULTS

Sex	Stature (mm)				TTB (mm)			
	Range	Mean	± SD	SE	Range	Mean	± SD	SE
Total (Male and Female)	1400-1840	1598.53	95.76	5.52	240-330	258.14	24.49	1.41
Male	1480-1840	1668	67.83	5.53	210-330	265.46	23.59	1.92
Female	1400-1720	1529.07	63.91	5.21	190-305	250.82	23.21	1.89

Table 1: Showing Range, Mean, SD, Se of Stature and TTB in Male and Female

To estimate stature from TTB, regression equations were derived from linear regression analysis in males and females separately as well as together. [Table 2]

$$Y = x \times b + c \text{ (Y = Stature, x=TTB, b = Regression coefficient, c = Constant)}$$

	Regression Equations	Correlation Coefficient 'r'	95% Confidence Interval
Males & Females together	Stature = TTB × 1.602 + 1184.91	0.41	1.196-2.009
Males	Stature = TTB × 0.901 + 1428.740	0.31	0.458-1.345
Females	Stature = TTB × 0.748 + 1341.455	0.27	0.318-1.178

Table 2: Showing Regression Equations, Correlation Coefficient and 95% Confidence Interval for Stature Estimation from TTB in Male and Female

Statistically significant correlation was observed between stature and TTB in both sexes. Correlation between stature and TTB in males and females were 0.31 and 0.27 respectively. But in males and females together, correlation was 0.41. (Scatter plot 1, 2 and 3)

Scatter Plot 1 Showing Correlation of Stature with TTB in Males

Scatter Plot 2 Showing Correlation of TTB in Females

Scatter Plot 3 Showing Correlation of Stature with TTB in both Males and Females

DISCUSSION

TTB is rarely used as a tool to estimate stature. After a thorough search of literature, it was found that Ozaslan et al did a similar type of study. In his study, stature was measured from TTB on Turkish population. Mean stature and mean TTB of present study is less than that of by Ozaslan et al [Table 3]. The reason may be well built and tall statured Turkish population as compared to Indo-Aryans.^[8] The correlation coefficient (r) of stature with TTB of present study for males and females are more than study of Ozaslan et al [Table 3].

Name of Researchers	Geographical Area of Study	Sex	Mean of Stature (mm)	Mean of TTB (mm)	Correlation Coefficient 'r' of Stature with TTB
Ozaslan et al	Turkey	M	1724.3	288.92	0.21
		F	1618.6	273.31	0.19
Present study	India	M	1668	265.46	0.31
		F	1529	250.82	0.27

Table 3: Showing Comparison of Mean of Stature, TTB and Correlation Coefficients of Present Study with that of Ozaslan et al.

Stature has been estimated from different long bones and various body parts by different workers. Value of correlation coefficients "r" for stature estimation from long

bones ranged from 0.56-0.76.^[9-12] from hand length [0.50-0.70] and hand breadth 0.30-0.70.^[13-15] from foot length [0.72-0.95] & foot breadth 0.66-0.76.^[16-19] and from arm span ranged from 0.89-0.90.^[20] Besides these, other dimensions like cranial length and cranial breadth have also been used for stature estimation with correlation coefficient "r" value ranging from 0.28-0.71.^[21] The best correlation coefficient was observed in the study done by Charnalia et al ($r=0.95$) using foot length.^[18] as a tool for stature estimation in male while in females the highest correlation was observed by Supare et al ($r=0.90$) using arm span.^[20] as a tool for stature estimation. The correlation coefficient with long bones is highest with ulna ($r=0.76$) [9] in males and clavicle ($r=0.68$).^[9] in females. In the present study correlation coefficient in both males and females ($r=0.31$ and $r=0.27$) are less than all these mentioned studies.

CONCLUSION

The present study used TTB to measure the stature. However, many better tools are available to measure the stature from different body parts or bones but this study provides an additional tool of stature estimation particularly in absence of other measures.

LIMITATIONS

Small sample size, covering a small part of India (Northern).

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