

ANTHROPOMETRIC MEASUREMENTS OF THE HAND LENGTH AND THEIR CORRELATION WITH THE STATURE OF ETHNIC TRIBAL ADULT MALES OF TRIPURA

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ABSTRACT: CONTEXT: As the incidences of crime are going on increasing, the matter of identification of an individual is becoming prime importance now days. Stature or body height is one of the most important and useful anthropometric parameter that determine the physical identity of an individual and require special attention in cases when bodies are found in mutilated state and only fragment are discovered. The study was done to estimate stature from the hand length on Two Hundred Tribal adult Males of Tripura. **Study design:** descriptive cross sectional study. **Place of Study:** Department of Anatomy, AGMC & GBP Hospital, Agartala. **MATERIAL:** 200 young and healthy male college students aged between 18 to 25 years having no disease or deformity were examined anthropometrically in respect to their height and length of right and left hand. **METHOD:** Measurement of stature and hand length of right and left side was taken with a standard anthropometer and a slide caliper respectively. **RESULT:** The present study showed significant ($p < 0.001$) positive correlation between the stature and hand lengths.

KEYWORDS: Anthropometric measurement, hand length, stature.

INTRODUCTION: Stature is natural heights of a person in an upright position. Estimation of stature forms important criteria for establishing individuality of a person and require special attention. This can be estimated from hand length.¹ The hand lengths can be used as a basis for estimating age- related loss in stature and as an alternative measure to stature when stature cannot be measured directly due to deformity like kyphosis, lordosis and scoliosis, contracture or in cases, where bodies are found in mutilated state and only fragments are recovered. In these cases the original stature of those people can be estimated by multiplying the dimension of hand lengths of those sexes or ethnic groups with respective multiplication factor.¹ The multiplication factor can be obtained by making ratio of the stature to the hand lengths. Dimensional relationships between the body segments and the whole body have been of interest to artists, scientists, anatomists, anthropologists and medicolegalists for long time. The earliest evidence of the use of such rules comes from the ancient Egyptians. (Richer and Hale, 1971) Studies on the estimation of stature from skeletal remains or mutilated limbs, mostly of long bones have been reported as indicated by the published work of the Pearson (1899), Trotter and Glesser (1952).^[2,3]

The Indian perspective of the problem of stature estimation has been studied by Athwale et al (1963), Patel et al (1964), Joshi et al (1964, 65), and Jasuja et al (1991, 1993, 1997).^[4-7] The significant body segments for estimation of stature are length of foot, hand, hand with

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forearm, arm, upper extremity, length of head, height of head etc. Crown to rump and rump to heel ratio is also a significant dimensional relationship. In the present study length of hand of various subjects is measured anthropometrically for estimation of stature and the existing literature reveals that it is 5/19 of the stature.^{8,9}

MATERIAL AND METHODS: The study was a predominantly descriptive cross sectional study with some analytical components. The study was conducted at Agartala Govt Medical College, under department of Anatomy on 200 healthy male college students of the age group ranging between 19-25 years irrespective of caste, religion, dietary habits and socioeconomic stature etc. The subjects having any disease or deformity were not included in the study. The subjects were examined anthropometrically in respect to their height and the length of both hands.

Measurement of the stature was taken with a standard anthropometer. The stature was measured as the vertical distance from the vertex to the floor. Measurement was taken by making the subject stand erect on a horizontal resting plane bare footed having the palms of the hands turned inwards and the fingers pointing downwards with head oriented in Frank fort plane. Then, the movable piece of the anthropometer was brought in contact with the vertex in the mid sagittal plane. The length of each hand was measured using a sliding caliper. The subject was asked to place his hand on a table with the fingers together and thumb abducted. The measurement was taken from the proximal crease of the wrist to the tip of middle finger when the hand was held straight and stretched.⁶ The measurements were recorded in centimeters to the nearest 0.1cm.⁷ All the measurements were taken between 11.00 am to 02.00 pm by the same observer.¹

RESULT & OBSERVATIONS: The stature varied from 147.14 cm to 167.16 cm with mean value of 157.04 cm and the standard deviation of 6.12 cm. On the other hand, mean hand length of the right and left were 16.26(\pm 1.14) cm and 16.22 (\pm 1.28) cm respectively. The stature and other measurements are shown in Table 1 along with the multiplication factors used to estimate the stature from these measurements. The table also shows the correlation coefficients (r) and p values to reveal the relationships between specific measurements and stature.

In the present study there were a significant ($p < 0.001$) positive correlation between the stature and the length of the right and left hand (Figures 1 and 2).

DISCUSSION: Estimation of stature is an important parameter in medicolegal examinations and anthropological studies. Morphology of hand helps in estimation of stature therefore the study was carried out to investigate the relationship between the stature and length of hand.¹⁰ Diurnal variation also plays a significant role in the anthropometric measurement hence at the result of measurement were taken at a fixed time. The multiplication factor was calculated and the accuracy of the estimated height was checked by comparison with the actual stature. Similarity of the results indicates that the length of forearm and hand provides an accurate and reliable means for estimation of stature of mutilated body of an unknown individual.^{11, 12} In the present study the mean stature was 157.04 (\pm 6.12) cm and the mean length of the right and left hand was 16.26(\pm 1.14) cm and 16.22 (\pm 1.28) cm. respectively. The multiplication factor of right side was

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9.66 and left side was 9.68. In the present study we found some multiplication factor. Multiplying these multiplication factors with the hand length we found some estimated statures which were correlated with the measured stature.

All the measurements in this study were a positive as well as a statistically significant correlation with the stature⁵

CONCLUSION: From the present study we found some multiplication factors which were helpful for tripuri adult males for estimation of stature from respective hand lengths. That may be helpful for those who work in this area especially in the various medical disciplines, anthropologists.

200 young and healthy male college students aged 19 to 25 years having no disease of deformity were examined anthropometrically in respect to their stature and length of hand irrespective of their caste, religion, dietary habits and socio-economic strata. The stature varied from 147.14cm. to 167.16 cm. with mean value 157.04cm. and the standard deviation 6.12 cm. on the other hand length of hand was found to be 16.26 and 16.22 cm respectively and multiplication factor is calculated as 9.66.

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Variables	Range (cm)	Mean value (cm)	SD (cm)	Mean Multi-plication factor	Corelaton of the hand length measurement with stature	
					r	p
Height (Stature)	147.14-167.16	157.04	6.12			
Hand length (right)	14.10-18.11	16.26	1.14	9.66	0.64	0.001 S
Hand length (left)	13.82-18.10	16.22	1.28	9.68	0.64	

Table 1: Measurement of height (Stature) and hand length in males

n=200S: Significant r: correlation coefficient p: probability ($p < 0.05$ was considered as significant). Each multiplication factor is the ratio of the stature to the respective physical measurements.

Measurement from which the stature was estimated	Estimated stature (cm)			P value representing the differences between measured value and estimated value
	Range (cm)	Mean (cm)	Standard Deviation (cm)	
Right hand length	136.86-168.16	156.68	± 7.32	0.744 (NS)
Left hand length	130.42-166.54	153.32	± 7.78	0.738 (NS)

Table 2: Comparison of the measured stature with the stature estimated from hand length of the right and left side

The measured stature ranged from 147.14 to 167.16 cm with a mean (\pm SD) of 157.04(\pm 6.12) cm. n=200 NS = Non-significant.

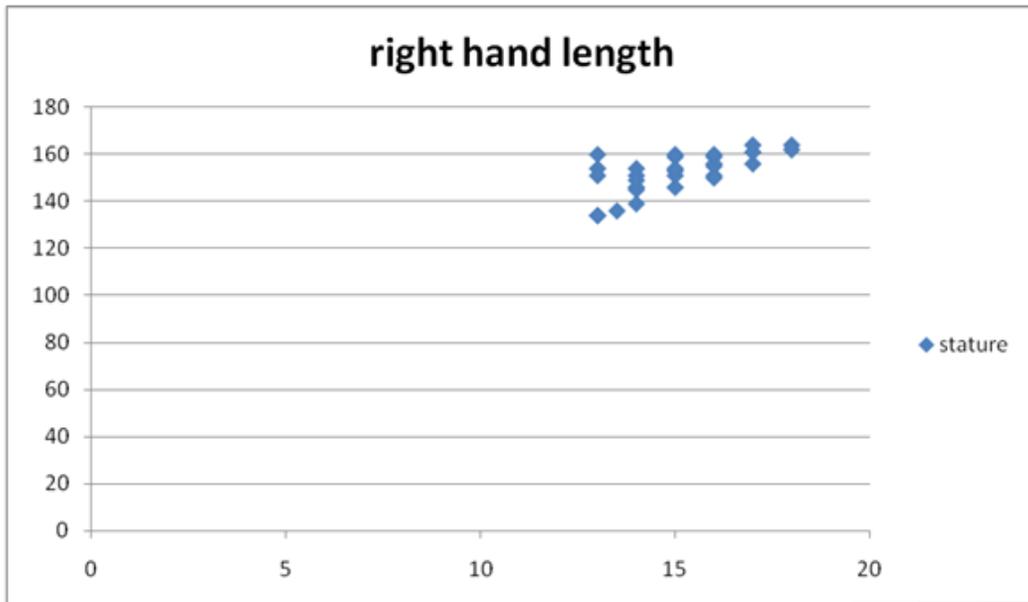


Fig. 1: scatter diagram showing the relationship between stature and right hand

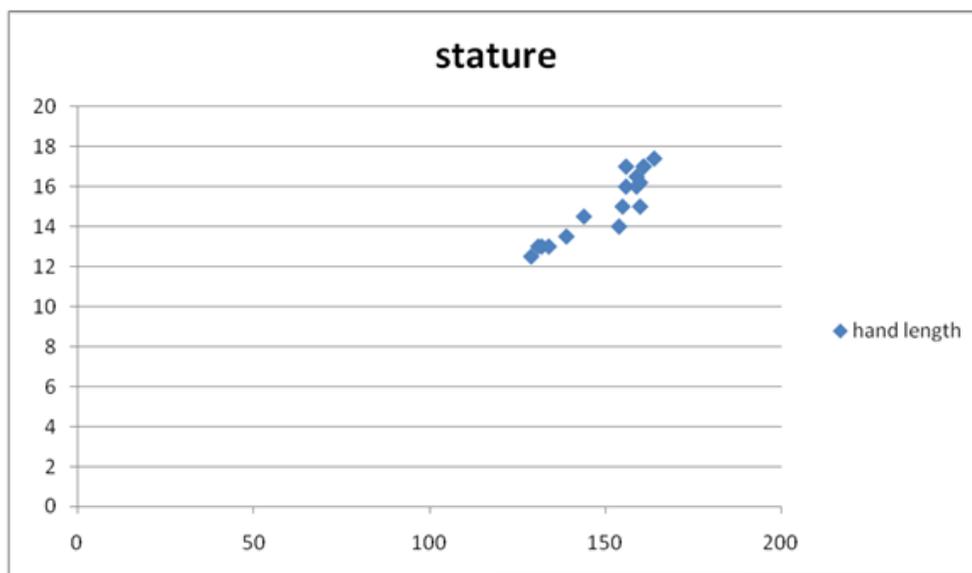


Fig. 2: Scatter diagram showing the relationship between stature and left hand

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