Original Research Article

ESTIMATION OF STATURE USING ULNAR LENGTH IN LIVING ADULT INDIVIDUALS IN SOUTH INDIAN POPULATION

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ABSTRACT

Introduction: Anthropometry the measurements of man provides scientific methods and techniques for taking various measurements and observation on the living man and the skeleton. Height is one of the important parameter in the Anthropometric study of humans.

Materials and Methods: In 300 adult males ulnar length on both right and left side was measured and height of individuals was measured.

Observations and Results: The observations were analysed separately for both right and left ulna in male students. The correlation coefficient (r) of height and length of right ulna is 0.689 and left ulna is 0.790.

Discussion: The values obtained from the present study are correlating with other studies and it will be most useful for medico-legal investigations and anthropological studies.

Conclusion: simple regression formula was derived showing the correlation between ulnar length and stature of an individual.

KEY WORDS: Ulnar length; Height; Anthrapometry; Regression formula;

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INTRODUCTION

Anthropometry the measurements of man provide scientific methods and techniques for taking various measurements and observation on the living man and the skeleton. Height is one of the important parameter in the Anthropometric study of humans [1]. Correlation of height from pharmacokinetic parameters and evaluation of Nutritional status rely on accurate measurements of not only body weight but also height. However, a number of common disabilities and disease processes make it difficult to accurately measure standing height in many patients. Therefore, various formulae based on bones that do not change length have been developed. Forearm length is one among important parameter used to determine the height. The ulna being long bone located on the

medial side of the forearm has proximal process called olecranon and distal end called as styloid process both of these are located subcutaneously and easily palpable.

Ossification of ulna begins at the 8th week of fetal life. The proximal epiphysis fuses with the shaft in 16th year and distal epiphysis with the shaft in 18th year in males [2]. The ulna length are very few studies conducted in the South Indian Population. Hence this study to establish regression formulae between percutaneous ulna length and height of an Individual will be of utmost significance to forensic experts, Nutritionist and Anatomist.

MATERIALS AND METHODS

This study was conducted on 300 medical, Dental and parmedical male students of Vinayaka Mission's University, Salem, Tamilnadu. The age of the students ranged from 20-23 years who belonged to South Indian region. The ulna length was defined as the direct distance between the tip of the olecranon process to the tip of the styloid process while the elbow flexed and palm spread over opposite shoulder.Height was measured by measuring crown to heel standing erect posture with anthropometer. Measurements of length of right and left ulna were taken separately for calculation. Stastistical analysis was done using SPSS software.

OBSERVATIONS AND RESULTS

The observations were analysed separately for both right and left ulna in male students and results are tabulated in the table-1 and table-2 to show the different parameters. The correlation coefficient (r) of height and length of right ulna is 0.689 and left ulna is 0.790. Correlation coefficient between total height and ulna length shows positive relationship in adult male population of the study. Figure -1 and figure-2 shows graphical representation where X-axis represents ulna length and Y-axis represents height. The graph shows positive relation between the height and ulnar length of the individual. Pearson's correlation coefficient was used to examine the relationship between total height and ulna length in adult males which was found to be statistically significant and positive.

Linear Regression analysis was performed for estimation of stature using the ulnar length as independent variable.

Simple regression formula is $Y=a+Bx$

Estimated height for right ulnar length

Height= 93.76+2.51(Right Ulna)

Estimated height for left ulnar length

Height= 85.76+2.81 (Left Ulna)

Table 1: Showing the Descriptive Statistics.

	Range	Minimum	Maximum	Mean	Std. Deviation
Age	5	19	24	20.52	1.007
Height	24	150	174	161.93	6.582
Rt Ulnar length	9	22	31	27.105	1.8031
Lt Ulnar length	9	22	31	27.11	1.851

Table 2: Showing the Correlations between two sides.

		Rt Ulna	Lt Ulna
Height	Pearson Correlation	.689**	.790**
	P Value	0.001	0.001
	N	300	300

Fig. 1: Correlation of Height with Right Ulna length.
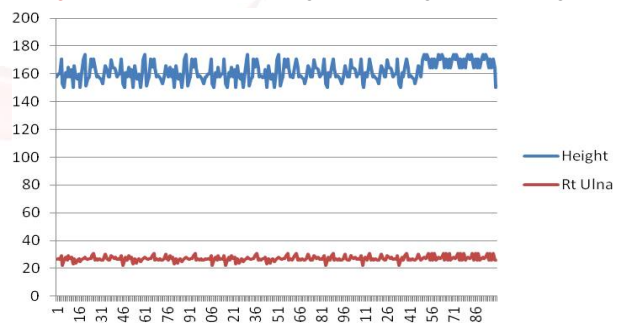
Height= 93.76+2.51* Right Ulna R square= .475 p value .001

Fig. 2: Correlation of Height with Left Ulna.
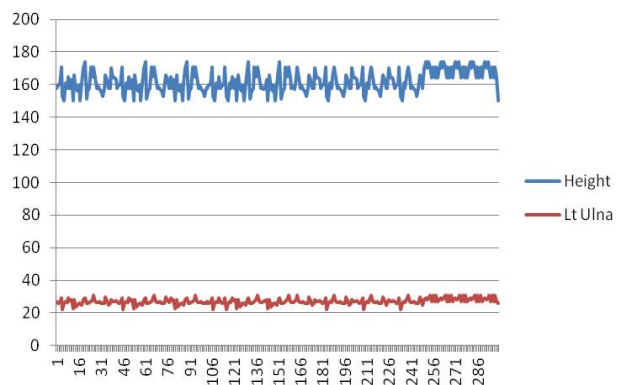
Height= 85.76+2.81*Left Ulna
R Square= .624, P value .001

DISCUSSION

Measurement of height is essential for the calculation of body mass index.The present study deals with observations on correlations of total standing height with length of ulna .

Although variety of methodologies have been proposed to predict stature from long limb bones, regression analysis proved to be the easiest and the reliable method [3].

Allbrook D [4] in his his study for estimation of stature from the length of ulna derived regression formulae as Stature=88.94+3.06(ulnar length)+/_4.4(standrard error).

Lal & Lala [5] in their study of 258 subjects of age ranging from 12 to 21 years in North Bihar for the estimation of height by surface Anatomy of long bones. They have claimed that ulnar multiplication factor is better guide for calculation of height when it is not definitely known to which part of country the individual belongs.

Sarojini devi et al [6] estimated correlation co-efficient (r=0.619 for male and 0.584 for female) and regression equation formula for estimation of stature by using upper arm length among living population of maring tribes of pallel area, chandel distict, Manipur, India.

Maloy kumar et al [7] in their project use of length of ulna for estimation of stature in living adults study was done on 300 males of 20-50 years of Burdwan District and adjacent areas of west Bengal, correlation coefficient (r) of height and length of right ulna is 0.78633 and left ulna is 0.68710.

Ilayperuma et al [8] conducted a study on 258 subjects with an age span of 20-23 years and found Regression equations for stature estimation for male Height=97.252+2.645(ulna length) and for females Height =68.777+3.536(ulna length) for both male and female combined Height=57.385+4.047(ulna length). Anjali Prasad et al [9] carried out study on Variety of factors such as age, race, gender and nutritional status affect human development and growth and therefore, different nomograms are required for different population. In the present study the correlation coefficient (R) of height and length of right ulna is 0.689 and of left ulna is 0.790.

Regression equation for right ulna:
$$Height=93.76+2.51$$
Regression equation for left ulna:
$$Height= 85.76+2.81$$

CONCLUSION

Simple regression equation derived from this study can be used to determine the height in males of south Indian region. This fact will be of practical use in medico legal investigations and in anthropological and archeological studies where the total height of a subject can be calculated if the ulna length is known.

Conflicts of Interests: None

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