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Research Article

FOOT AND ITS RELATIONSHIP TO STATURE OF ADULT POPULATION – AN ANTHROPOLOGICAL STUDY

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ABSTRACT

Estimation of stature from various measurements of the body is vital to medico legal investigations. Anthropometric measurements differ in different races, sex and age groups. Aims & Objectives: To assess the hand length, foot length and stature of the individual and to correlate the hand length, foot length and the stature. Study also predicts the stature of an individual by hand length, foot length using regression analysis

Conclusion - If either of the measurement (hand length, & foot length or total height) is known, the other can be calculated. This fact will be of practical use in medico legal investigations and in anthropometry.

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INTRODUCTION

Anthropometry is a systematized measuring tool that expresses dimension of the human body and skeleton. It is highly objective and reliable in the hands of trained anthropometrics. Anthropometry, the typical and the traditional tool of physical anthropology, provide the scientific methods and techniques for estimating the various measurements and the observations on the living as well as skeleton of man. It is well known that there is a definite relationship between the height of the person and various parts of the body like head, trunk and lengths of extremities. The relationship between body segments has been used to compare and highlight variations between different ethnic groups and to relate them to locomotor patterns, energy expenditure, and lifestyle.

Height estimation by measurement of various long bones has been attempted by several workers with variable degree of success. Each worker has derived his own formula for calculating the stature from long bones. However, foot measurement has not frequently been used for this. It was Rutishauser (1968) who for the first time showed that reliability of prediction of height from foot length was as high as that from long bones.

MATERIAL AND METHODS

Selection Criteria

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200 subjects (100 males and 100 females) in the age group of 17-21 years.

The study was conducted on the medical students of Jhalawar Medical College, Jhalawar (Rajasthan).

Data Collected

1. Stature: (Standing height of an individual's).
2. Hand length (B/w midpoint interstyloid line to tip of middle finger)
3. Foot length (B/w most prominent point of back of the heel to the tip of hallux).

METHODOLOGY

By Regression Equation

Material :- In above methods all measurements will be done using following materials:-

1. Stature Meter.
2. Spreading Caliper (Blunt Ended)
3. Vernier Calliper

Data Analysis

Data thus collected will be reloaded on a pre- designed Performa & will statistical test.

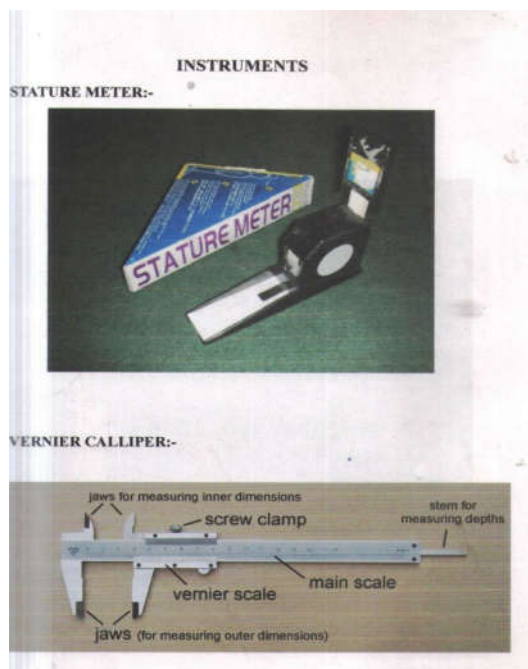
Inclusion Criteria

- Similar socio-economic status.

- Age group of students ranged from 17 to 27 years
- Measurements were taken at fixed time b/w 2 to 5 p.m. to eliminate the discrepancies due to diurnal variation.

Exclusion

- Age above 27 and below 17 year excluded
- Time other than b/w 2 to 5 p.m. excluded



RESULTS

Study Design: A Cross-sectional study of 200 medical students, 100 male and 100 female was undertaken to evaluate the correlation of body height, hand length & foot length and develop the prediction model to predict body height using the Hand Length & food length.

Table 1 Gender distribution

Gender	Number	%
Male	100	50
Female	100	50
Total	200	100

Table 2 Age distribution

Age in years	Number (n=200)	%
17	23	11.50
18	29	14.50
19	37	44.50
20	35	62.00
21	31	77.50
22	22	88.50
23	06	91.50
24	03	93.50
25	14	100

Table 3 Person correlation of hand length, foot length and body height. Person correlation of body height (cm)

	Male (n=100)	Female (n=100)	P value	All cases
Hand Length (cm)	.941	.946	0.000	.498
Foot Length (cm)	.5642	.9023	0.000	.637

The Correlations of hand length and height in cm was observed to be statistically significant with respective to gender. When both male and female are observed together (n=200), the degree of relationship between body height and hand length is significant.

The Correlations of food length and height in cm was observed to statistically significant with respective to gender. When both male and female are observed together (n=200), the degree of relationship between body height and foot length is significant. The regression analysis was carried out to find the strength of relationship of hand length with body height. The relationship between hand length and body length is positive and for every unit increase in head length there is significant (2.41 in male & 2.75 in female) increase in body height.

The regression analysis was carried out to find the strength of relationship of foot length with body height. The relationship between foot length with body height. The relationship between foot length and body height is positive and for every unit increase in head length there is significant (1.03 in male & 2.41 in female) increase in body height.

DISCUSSION

Bodily proportions and absolute dimensions vary widely with respect to age, sex, within racial groups and between racial groups. In spite of this variation, height has been estimated from measuring various other parameters of the body by refining formulae. The values have become increasingly important in the identification of person.

The stature of an individual mainly being genetically predetermined is an inherent characteristic, the estimate of which is considered to be an important assessment in the identification of unknown human remains.

In present study, approximate stature has been estimated from hand, & foot measurements.

History of estimating stature using various other parameters of the body in different age groups are also available. Various parameters used are superior extremity length by Shroff AG 197915; feet, hand, fingers & phalangeal lengths by OP Jasuja 2004 and Krishan 200742, diaphyseal length of upper and lower limbs by AM Vare 1977; lengths of long bones34, 37, 40 humerus, radius and ulna 19, 38, tibia35, femur39, small bones like metatarsal 29, vertebrae32, calcaneous33. According to Glaister (1957) head length is 1/8th of the total height of an individual. He fails to mention the age and sex of the individual included in his study.

CONCOUSION

With respect to age, sex and racial groups, dimensions and body proportions are widely variable. The present study has shown the usefulness of hand length & foot length measurement in the estimation of stature amongst medical students age b/w 17-27 years belonging to Different regions of Rajasthan. Regression formulae for stature estimation from hand length, & foot length measurement were derived in both males and females.

Correlation coefficient of
Hand length & height +0.947 in males and +0.946 in females
Foot length & height +0.564 in males and +0.902 in females

The regressions equation derived are

For Hand length & height:- **Males : $Y = 129.71 + 2.41 (X)$**
Females: $Y = 110.57 + 2.75 (X)$
Where $Y = \text{Total Height}$.
 $X = \text{Hand Length}$

For Foot length & Height:- **Males : $Y = 145.48 + 1.03 (X)$**
Females : $Y = 101.75 + 2.4 (X)$
Where $Y = \text{Total Height}$.
 $X = \text{Hand Length}$

If either of the measurement (hand length, & foot length or total height) is known, the other can be calculated. This fact will be of practical use in medico legal investigations and in anthropometry.

Summary

Estimation of stature from various measurements of the body is vital to medico legal investigations. Anthropometric measurements differ in different races, sex and age groups. Many workers have attempted to estimate the stature of the individuals belonging to different races and age groups using different measurement of the body. Correlation coefficients and formulae derived for regression equation to estimate the approximate heights are age and race specific.

Some authors have shown positive correlation between height, hand length, & foot length of various age groups. The points of measure for the hand length, & foot length vary according to different authors.

In present study: material consists of 200 medical students of both sexes, aged between 17-27 years belonging to Rajasthan. Hand length Foot length and stature were measured in Jhalawar Medical College, Jhalawar at fixed time to avoid diurnal variations.

Hand Length: was measured (B/w midpoint interstyloid line to tip of middle finger)

Foot Length: was measured (B/w prominent point of back of the heel to the tip of Hallux) using blunt ended spreading caliper & vernier caliper.

Height was measured stature metre, from vertex to floor, with the subject standing in erect posture, with head in Frankfurt's plane. The results show that there is positive correlation between the stature and hand length, & food length.

Regression Analysis: was carried out to derive equations which can be used to estimate the stature of medical students aged between 17-27 years in Jhalawar, Rajasthan.

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