ORIGINAL ARTICLE

Pattern of Anthropometric Measurements in The Population of Rawalpindi

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Author`s Contribution

[1,2]Conceived the topic of research and designed the study, manuscript writing
[3]Literature review/data analysis and Active participation in Methodology

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ABSTRACT

Objective: Estimation of Height from the various Anthropometric Measurements in Pakistanis.

Design: Cross sectional, observational.

Place and duration of study: Rawalpindi Medical College, Rawalpindi from June 2015 to August 2015.

Subjects and methods: A data tool was designed and a group of 100 medical students of third-year MBBS were trained to collect the data. It comprised of measuring height, the length of the right arm, right hand and right middle finger. The data was cleaned on excel then analyzed on SPSS version 10.

Results: A sample of above 20 years' subjects n=500 subjects (females n=222and males n=278) were included in the study. The average body height among the male and female respondents was found to be 1.71 and. 1.61 meters respectively with combined average of 1.66 meters. The average Length of Right arm among the male and female respondents was found to be 72.43 and 70.05 Cm respectively with combined average of 71.37 Cm. The average Length of right hand among the male and female respondents was found to be 18.59 and 17.69 Cm respectively with combined average of 18.19 Cm. The average length of Right middle Finger among the male and female respondents was found to be 8.37 and 8.11 Cm respectively with combined average of 8.25 cm. All above for the aggregate study population. The cross-tabulation of variables right-hand length and stature showed the association to be of statistical significance as the p-value found was much greater than 0.05.

Keywords: Stature, Anthropometric Measurements, Forensic Science, Pakistanis

Introduction

Anthropology deals with the measurement of various parts of the body and named Bertillon system or Bertillonage after Alphoso Bertilon, a French criminologist who introduced it in 1882.It is based on the principle that various body parts measurements do not alter after 21 Years and that no two persons show the same measurements in all respects. The system is, therefore, applicable to adults only.[1]

Identification means the establishment of individuality of a person. In medicolegal cases, it is very important in living as well as in dead. It may be complete or partial. Complete identification means the absolute fixation of the individuality of the person. Partial identification means ascertainment of some facts e.g. race, sex, stature etc.[2] Identification of human remains is a crucial problem and is of immense importance to the forensic expert. Individual stature is an inherent characteristic among

various identification parameters and is important in cases where only fragmentary or mutilated remains of an unknown person are recovered. The length of certain long bones and appendages of the body represent a certain proportional relationship to the stature. The orthodox methods of estimating stature are limited to measuring whole limb bone and correlating living stature and limb bone length,[3] but few studies are reported in which an attempt has been made to estimate stature from fragmentary or mutilated parts of the body. In the present paper an attempt has been made to derive some regression formulae to indicate a relationship between height and hand length in healthy adult individuals in both genders. This information will be highly important to Forensic scientists, human biologists and physical anthropologists for estimation of stature from the fragmentary remains of the upper limb. The relationship that exists between different body parts and height is of great interest to anthropologists, forensic and medical scientists, because of the increase in the number of catastrophic events causing mass deaths from natural or manmade errors like flooding, tsunamis, earthquakes, plane crashes, train crashes, terrorist attacks. All usually require identification of victims from fragmentary and dismembered human remains.[3,4,5] Earlier reports have shown that relationship exists between stature and hand length and foot length.[4-7]

Stature or height of a person increases progressively and becomes maximum at the age between 21 and 25 years. Later, for every25 years, it is shortened by 2.5 cm due to thinning of intervertebral discs and some stooping posture as a result of decreased muscle tone. When both arms are outstretched in a straight line the distance between the tips of middle fingers is approximately equal to the stature of the person. Stature is approximately equal to twice the length from vertex to symphysis pubis or equal to twice the length from symphysis pubis to one side heel, with the hip and knee extended and ankle dorsiflexed.[8]

Methodology

A data tool was designed and a group of 100 medical students of third-year MBBS class of the college were trained to collect the relevant data from the study population and permission from the ethical committee of the institutional review and informed consent from the participants taken. The data comprised of socio-demographic details and anthropometric measurements of a sample of n= 500 (females n=222and males n=278) from a population of Rawalpindi including body height, the length of the right arm, the length of right hand and right middle finger. Height was measured by making the subject to stand erect by touching the buttocks and back of the shoulders and external occipital protuberance to Stadiometer, keeping the head horizontal at Frankfort Plan and measuring the height in a mid-sagittal plane at the top up to 1 mm. The length of the right hand is measured with vernier caliper from distal ventral wrist crease to the tip of middle finger. Right middle finger length is measured from distal ventral crease of metacarpo-phalygeal joint to tip of the finger by vernier caliper up-to 1 mm.

Right Arm length is measured from from the center of the elbow crease to the tip of the middle finger by osteometerupto 1 mm.

The data was first cleaned on excel and was entered and analyzed using SPSS, version 10.

Results

A sample of n=500 subjects (females n=222 and males n=278) were included in the study using convenient sampling method. The inclusion criteria normal adult population of above 20 years age.

Table No. 1: The Respondent's Profile

Characteristics		N and %
Age groups	20—30	476 (95.2%)
	30—40	9 (1.8%)
	40—50	8 (1.6%)
	>50	7 (1.4%)
Sex	Female	222 (44.4%)
	Male	278 (56.6%)

The average body height among the male and female respondents was found to be 1.71 and. 1.61 meters respectively with combined average of 1.66 meters for the aggregate study population.

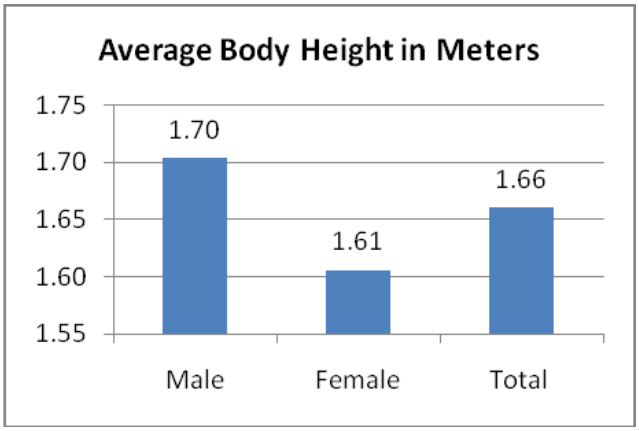

Figure 1: Average Body Height in Meters

The average Length of right hand among the male and female respondents was found to be 18.59 and 17.69 cm respectively

with combined average of 18.19 cm for the aggregate study population.

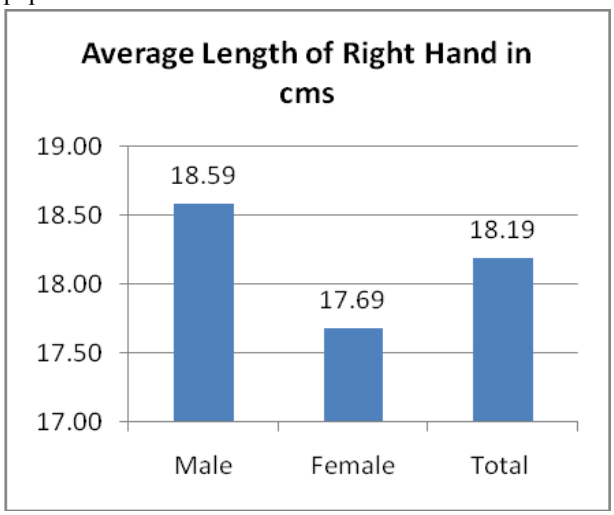

Figure 2: Average Length of Right Hand in cm.

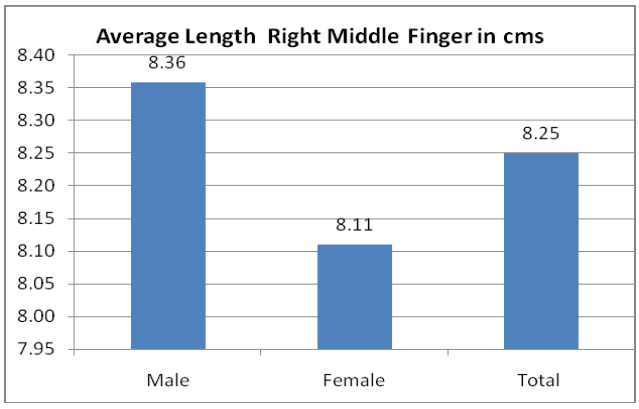

Figure 3: Average Length of Right Middle Finger in cm.

The average length of Right middle Finger among the male and female respondents was found to be 8.37 and 8.11 cm respectively with combined average of 8.25 cm for the aggregate study population.

The average Length of Right arm among the male and female respondents was found to be 72.43 and 70.05 cm respectively with combined average of 71.37 cm for the aggregate study population.

Discussion

Various researchers with a variable degree of success have attempted the estimation of stature from various long bones. The difficulty in availability of adequate quantities of bones, in the choice of bones; their cleaning and the need of trained personnel are encountered while correlating bone dimensions with stature.[10-15] The height was estimated from hand length of 250 Punjabi boys between 17-25 years by deriving regression equations within the error of 3-6 cm.[16] The regression equations were derived from hand length and correlated it with stature among Punjabi males.[17] An attempt was also made to derive regression formulae from hand length among 100 Nigerian adult male medical students of Jos Medical School, Nigeria and the results showed a significant correlation between stature and hand length.[18] A study was conducted on 166 subjects and statistically analyzed the data indicating a close similarity of relationship between stature and hand measurements and also derived the regression equations.[19]

Estimation of height and weight from different body parts has received great attention in anthropology and forensic sciences. This study was designed to investigate the ability to estimate stature from the second (2D) and fourth (4D) digit lengths. Subjects were students and staff of the Ahmadu Bello University, Zaria, males n= 650 (mean age 20.64 ± 6.94) and females n= 435 (mean age 18.73 ± 6.29) participated in the study after given informed consent. Measurements of 2D and 4D lengths, height and weight were made following standard protocols. The result showed that height can be predicted from the lengths of right and left 2D and 4D significantly ($P < 0.001$). This study has demonstrated that body parts such as finger lengths can be utilized for the estimation of height and weight.[20]

This study was designed to see if there is a relationship between 2D, 4D lengths with height and weight. These parameters could be used to predict height and weight, as different body parts have been used for the prediction of height and weight for the possible identification of individuals in forensic investigation.[21-24]

This study was designed to highlight the pattern of various anthropometric measurements in the residents of Rawalpindi district. This information can be critical to a forensic investigation for the establishment of personal identity.

Conclusion

There exists variability regarding anthropometric measurements in the local population of Rawalpindi District. It needs further exploration with special reference to the relationship between various anthropometric measurements in both male and female population. Due to certain limitations, the results of this study cannot be generalized however, these can be valuable to design a national level research study.

Limitation: There are few studies reported in which an attempt has been made to estimate stature from fragmentary or

mutilated parts of the body. Therefore, only a few latest references are found.

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