

Estimation of Stature from Various Circumferences of the Body among Brahmin and Yadava Community of Lucknow, Uttar Pradesh

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Abstract

The present study aims to reconstruct stature among male and female of Brahmin and Yadava community of Lucknow, Uttar Pradesh, using different circumferential parts of the body. To this aim the stature and whole circumference (Head Circumference, Neck Circumference, Chest Circumference (Normal Position), Mid Upper Arm Circumference, Wrist Circumference, Maximum Condylar Circumference, Abdominal Circumference, Waist Circumference, Hip Circumference, Thigh Circumference, Knee Circumference, Calf Circumference etc) of the body were recorded on each subject using the standard measurement techniques recommended by Martin and Saller. The data is composed of total 200 subjects of Brahmin and Yadava communities (During the pilot study covered 50 males and 50 females of each group and collected the full data from this selected group) within the age range of 20-50 years. Multiplication factors (M.Fs) and linear regression equations for stature estimation were produced using the above mentioned variables. Analysis of data reveals that the Brahmin and Yadava community males are taller than the females. The sex differences have been observed to be highly significant. Analysis of the study reveals that in the case of Brahmin males only weight is contributing significant role to predict the height and in the case of females head circumferential part and weight is contributing significant role to predict the height, In the case of Yadava community males condylar circumferential (Right and Left both) part contributing significant role to predict the height and in the case of Yadava female no one circumferential part is significantly contributing any role to predict the height. The study highlights that the weight is provide the best estimate of stature. However, the estimated stature may not be quite reliable using other circumferential parts of the body among both communities of males and females as it exhibits the lowest correlation with stature. Analysis of data clearly indicates that the dependability in the predicted stature would be better on using linear regression equations for any of these body dimensions as compared to the use of M.Fs for this purpose.

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I. Introduction

Forensic is the application of science to law. Reconstruction of stature is one of the important aspects of various parameters of identification for establishing individuality of the person. It is one of the important criteria for establishing identification of unknown person/dead body. It is usually measured as standing height of the individual. Evaluation of stature is difficult when dead bodies are mutilated, burnt or skeletonized. Reconstruction of stature from skeletal/dismembered remains is not new for Anthropologists/Forensic experts. Under the circumstances, where mutilated, decomposed or fragmentary skeletal remains are recovered, the stature of an individual may be estimated by adopting anatomical method; if complete skeleton is available for examination or by following mathematical method where measurement of a single long bone may serve the purpose because there is a strong relation between skeletal element and stature. This means that measurement of any bone or combinations of bone reflect stature.

II. Material and Method

The study has done with the help of both primary and secondary sources of data. But the actual emphasis will be of primary data. As earlier told, the research has mainly based on primary data. To collect the primary data, an intensive field work has carried among the Brahmin and Yadava population of Lucknow, Uttar Pradesh. After the selection of subjects for the study with purposive sampling method, Anthropometric measurement collected has Along with other relevant data. The secondary data has collected through different

Documents, Registers, Files, and other relevant papers from various Government/Non-Governmental sources like Department of Culture, Anthropological Survey of India, Forensic Science Department, Criminological Department, Judicial sources and Administrative section of UP Council an India etc, have also consulted. Internet, related books, articles and other publications have also consulted for evaluation and comparison.

In the present study, an attempt has been made to investigate the co-relation between stature and different body measurements among the Brahmin and Yadava community of Lucknow, Uttar Pradesh. Different anthropometric measurements of the study sample have taken. In this phase, basically, researcher used the anthropometric method to collect the data and also filled some health related information in the prepared schedule.

III. Methodology

The primary data has collected by Anthropometric Measurements. Measurements have taken on both communities Brahmin and Yadava of Lucknow, Uttar Pradesh - males as well as on females. The subjects for the study have taken between age group of 20-50 years, as the morphological features are well developed at this stage. The Anthropometric measurements will be carried out following the conventional methods of Weiner and Laurie. Anthropometric measurements have recorded in centimeters (cm). Total 13 Anthropometric measurements have taken. These are - Stature, Head Circumference, Neck Circumference, Chest Circumference (Normal Position), Mid Upper Arm Circumference, Wrist Circumference, Maximum Condylar Circumference, Abdominal Circumference, Waist Circumference, Hip Circumference, Thigh Circumference, Calf Circumference, Knee Circumference etc. Required Statistical method have used for the analysis, interpretation, and representation of the data.

IV. Result

The observation was done on total male and female of Brahmin and yadava community of lucknow, Uttar Pradesh. In this regard the classification of data is given below –

Table 1: Distribution of subject according to caste and gender wise

| S.No. | Community | Male | | Female | | Total |
|--------------|-----------|------|-------|--------|-------|--------------|
| | | No. | (%) | N | (%) | |
| 1. | Brahmin | 50 | 25.51 | 50 | 25.51 | 100 (51.02%) |
| 2. | Yadava | 50 | 25.51 | 50 | 25.51 | 100 (51.02%) |
| Total | | | | | | 200 |

For the completion of aims and objective of this research to regression analysis had done to find out that any circumferential part of the body are significantly contributing to the height or not. For that, regression analysis did individually one by one, circumferential part of the body with the dependent value (height) separately for Brahmin and Yadava community either gender wise, with the help of SPSS Statistical Package.

Brahmin Community

Stature:-

Table 2, presents mean, standard deviation, minimum and maximum value of stature of male and female of Brahmin community of Lucknow, Uttar Pradesh. The standing height of male of Brahmin community varied from 148.50 cm to 188.00 cm with mean value of 167.07 cm and standard deviation value of 8.83. the stature of female varied from 135.00 cm to 170.00 cm with mean value of 154.66 cm and standard deviation value of 6.21.

Table 2: Gender wise Distribution of the study group (Brahmin male and female) according to Mean, Standard Deviation with the Minimum and Maximum Range of Stature

| | Male (n-50) | Female (n-50) |
|---------------------------|-------------|---------------|
| Minimum | 148.50 cm | 135.00 cm |
| Maximum | 188.00 cm | 170.00 cm |
| Mean | 167.07 cm | 154.66 cm |
| Standard Deviation | 8.83 | 6.21 |

Table 3, presents means, standard deviation, minimum and maximum value of all Circumferential part of the body with Co-relation coefficient value and P value with regression equation of male and female of Brahmin community of Lucknow, Uttar Pradesh.

In the case of Brahmin male overall we can conclude that on the basis of regression analysis only weight is contributing significant role. From the ANOVA table $P < 0.05$, hence weight is significantly influence the height.

Here co-relation coefficient (r) value is 0.69. In the case of Brahmin female only head circumference and weight is contributing significant role. From the ANOVA table head circumference and weight $P < 0.05$, hence weight and head circumference is significantly influence the height. Here co-relation coefficient (r) value of head circumference is 0.29 and weight is 0.33. All other circumferential part of male and female of Brahmin community is giving non-significant value. So that, we can conclude that the weight is mainly much contributing to predict the height of the Brahmin community.

Yadava Community

Stature:-

Table 4, presents means, standard deviation, minimum and maximum value of stature of male and female of Yadava community of Lucknow, Uttar Pradesh. The standing height of male of Yadava community varied from 150.00 cm to 172.00 cm with mean value of 161.83 cm and standard deviation value of 6.85. The stature of female varied from 122.00 cm to 165.00 cm with mean value of 152.27 cm and standard deviation value of 8.60.

Table 4: Gender wise Distribution of the study group (Yadava male and female) according to Mean, Standard Deviation with the Minimum and Maximum Range of Stature

| | Male (n-50) | Female (n-50) |
|---------------------------|-------------|---------------|
| Minimum | 150.00 cm | 122.00 cm |
| Maximum | 172.00 cm | 165.00 cm |
| Mean | 161.83 cm | 152.27 cm |
| Standard Deviation | 6.85 | 8.60 |

Table 5, presents means, standard deviation, minimum and maximum value of all Circumferential part of the body with Co-relation coefficient value and P value with regression equation of male and female of Yadava community of Lucknow, Uttar Pradesh.

In the case of Yadava male overall we can conclude that on the basis of regression analysis only condylar circumference (Right and Left both) is contributing significant role. From the ANOVA table $P < 0.05$, hence condylar circumference is significantly influence the height. Here co-relation coefficient (r) value is 0.22. In the case of Yadava female no one circumferential part is significantly contributing any role to predict the height only two circumferential parts are giving nearest value of P, i.e. condylar and Calf circumference (Right and Left both), From the ANOVA table the Significant value of condylar circumference is 0.06 and Calf circumference value is 0.06, the co-relation coefficient value is 0.26 and 0.26 for both. Hence condylar and calf circumference is giving nearest significant value so that it's hopefully influence the height. All other circumferential part of male and female of Yadava community is giving non-significant value. So that, we can conclude that only condylar and Calf circumference is contributing to predict the height of the Yadava community.

Table 3 & 5 also shows regression equation for estimation of stature (in cm) from all circumferential measurements in Brahmin and Yadava (male and female) community of Lucknow, Uttar Pradesh, India. There are separate equations for each circumference measurements which can help in estimation of stature from individual circumference part of body. The regression equations have calculated by regression analysis of the data and the value of constants 'a' and 'b' are calculated; where 'a' is the regression coefficient of the dependant variable i.e. stature, and 'b' is the regression coefficient of the independent variable, i.e. any measurements out of whole circumference measurements of the body. Hence; stature (Height) = a + (b) x, where, x is any circumference measurement of the body. The regression formulae have been calculated separately from various circumference measurements of the body with stature by substituting the appropriate values of constants and b in the standard equation of regression line.

In the present study also used SPSS statistical Package for analyzing Independent sample T Test for finding out the differences between the gender and community. For that, firstly, I performed it gender-wise. The outcome is $P < 0.05$, here there is significant differences between male and female with regarding to their height. For finding out community- wiz differences, I had done the independent sample T Test. Here, the outcome is $P < 0.05$. It seems that there are significant differences between Brahmin and Yadava community with regarding to their height.

Weight is the most important part of our body to predict the height, but in the case of Yadava community both male and female weight is not significantly contributing any role, the reason is behind of that we can see in the whole data of Yadava Male and Female they haven't ideal weight according to their height, so that it's not giving the significant value to predict the height. We can also observe this in the BMI table no. 7. According to the guideline of WHO (Table-6) only 27 males of Yadava community have Normal Weight according to their height out of 46 Subjects and in the case of females only 23 females have Normal weight according to their height. So, here we can see that the ratio of Normal weight is very less. So, it's hopefully the

reason of non significant value. In the case of Brahmin community male and female ratio is average as compare to Yadava community, here, 31 male and female of Brahmin community have Normal weight according to their height out of 50 subjects in each group.

Table 7: Community and Gender wise Distribution of the study group according to BMI (Body Mass Index)

| S.No. | Community | Gender | Category of weight According to WHO (World Health Orgnaization) Guideline | Total no. of Subjects who have accurate weight according to their height | |
|-------|-----------------|---------------|---|--|-------|
| | | | | NO. | (%) |
| 1 | Brahmin (n-100) | Male (n-50) | Normal Weight | 31 | 62 |
| | | Female (n-50) | Normal Weight | 31 | 62 |
| 2 | Yadava (n-96) | Male (n-46) | Normal Weight | 27 | 58.69 |
| | | Female (n-50) | Normal Weight | 23 | 46 |

V. Discussion

The forensic Anthropologist and Medical experts encounter difficulty while dealing with dismembered bodies or those recovered in extremely decomposed form or in skeletonised form. To eliminate these difficulties, new methods are being developed for estimation of stature using regression formulae. Estimation of stature is a crucial requirement in post mortem examination of dead bodies specially when they are un-identified and badly decomposed, mutilated or skeletonised, it is also very much useful on that place they have some disaster like the terror attacks on 26th Nov 2008.

It is a known fact that the different population groups exhibit variation in their body proportions as a result of which correlation of one bone length to stature not only varies from population to population but also between sexes. A number of Multiplication Factors and Regression Equations have been developed to reconstruct stature from long bones throughout the world, but, estimation of stature in mutilated bodies especially from their bones is a tedious and time consuming process. Keeping this in mind, an attempt has been made in the present study to reconstruct stature among male and female Brahmin and Yadava community of Lucknow using different body circumferential measurements.

The estimation of height from various long bones has been attempted by many researchers since the development is influenced by a number of factors producing deference in skeletal proportions between different geographical areas. It is important to know such quantitative differences, table 1,2 ,3 and 4 shows co-relation coefficient between height and all body circumference part with height in total subject of both community (Brahmin and Yadava) of Lucknow, Uttar Pradesh in either sex.

Many researchers have tried to predict height using various bones and body parts measurements like; Dr. Kewal Krishan have shown a significant co-relation between height and cephalo-facial anthropometry measurements in north Indian population, Patel et al., have derived a regression equation between total height and foot length in Gujrat region, Agrawal, Sunil, Dikshit and Rani derived regression equation between hand length and total height, Amit et al., have also derived the height from length of distal half of upper limb, Akhtar et al., derived a regression equation between height and head measurements in Bangladeshi Garo adult females and find out significant co-relation with head circumference to predict the height using Multiplication factor analysis etc.

Here we can see many studies have been done in this regards. Present study has also derived the regression equation between height and different circumferential part of the body among Brahmin and Yadava (male and female) community of Lucknow, Uttar Pradesh. Here we can observe that in the case of Brahmin male only weight and Brahmin female weight and head circumference significantly contributing to predict the height and In the case of Yadava male Condylar circumference significantly contributing to predict the height and Yadava female Condylar circumference, calf circumference is giving the nearest significant value (not exact) to predict the height. Except these all other circumferential part of the body is not giving the significant value to predict the height of both community of Lucknow, Uttar Pradesh.

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