Research Paper

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

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Abstract

This study explores the relationship between various body circumferences and stature in Brahmin and Yadava communities of Lucknow, India. The aim is to develop methods for stature reconstruction using anthropometric measurements. Researchers measured head, neck, chest, arm, wrist, and leg circumferences (and more) on 200 participants (50 males and 50 females each from Brahmin and Yadava communities) aged 20-50 years. Standard techniques established by Martin and Saller were employed. The study found significant height differences between males and females, with males being taller in both communities. Analyses revealed that weight played the most significant role in predicting height for Brahmin males. Brahmin females showed significant contributions from both head circumference and weight. Interestingly, for Yadava males, condylar circumference (of both right and left sides) was the most significant predictor, while no single body circumference significantly predicted height for Yadava females. Overall, the study suggests that weight provides the most reliable estimate of stature. Using other body circumferences for stature estimation in both communities (males and females) yielded less reliable results due to weaker correlations with actual height. The research also indicates that linear regression equations offer a more dependable method for predicting stature compared to multiplication factors when using body circumferences
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I. Introduction

Forensic science plays a vital role in legal investigations, and stature reconstruction is a crucial aspect of identifying individuals. Determining a person's height is particularly important when dealing with unknown or deceased individuals, often measured as their standing height during life. However, estimating stature can be challenging when dealing with mutilated, burned, or skeletonized remains. Anthropologists and forensic experts have long employed techniques for reconstructing stature from skeletal remains, even when dismembered. In cases involving fragmented, decomposed, or incomplete skeletal remains, stature estimation can be achieved through two primary methods: anatomical and mathematical. The anatomical method utilizes a complete skeleton for examination, allowing for a more detailed analysis. The mathematical method, on the other hand, relies on the measurement of a single long bone, exploiting the strong correlation between specific skeletal elements and overall stature. This essentially means that the measurement of any bone, or a combination of bones, can provide valuable clues about an individual's height.

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 Registers, Documents, Files, and other papers from various Non-Governmental and Government sources like Culture Department - ASI (Anthro. Sur. of India), FSD Forensic Science Dept., CD Criminological Dept., Judicial sources JS and Administrate section of Uttar Pradesh (UP) Council an India etc, have also consulted. related books, Internet, articles and other related publications have also consulted.

In the present study, an attempt has been made to investigate the co-relation between stature and different body measurements among the Brahmin (B) and Yadava (Y) community of Lucknow, UP (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 (C), Waist Circumference (WC), Hip Circumference(HC), Thigh Circumference, Calf Circumference (CC), Knee Circumference (KC) 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

S.No.	Community	No.	(%)	N	(%)	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 17.00 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

Dismembered or severely decomposed bodies pose significant challenges for forensic anthropologists and medical examiners, particularly in estimating stature. To address these difficulties, new methods utilizing regression formulas for stature estimation are being developed. Stature estimation is crucial in post-mortem examinations, especially when dealing with unidentified, decomposed, mutilated, or skeletonized remains. This information is also valuable in disaster victim identification, such as the aftermath of the tragic terror attacks of November 26th, 2008.

It's well-established that body proportions vary across populations. This variation affects the correlation between individual bone lengths and overall stature, not only between populations but also between genders. While numerous multiplication factors and regression equations have been developed globally to estimate stature from long bones, this process can be laborious and time-consuming, especially for fragmented remains. In recognition of these limitations, the present study explores an alternative approach for stature reconstruction. The research investigates the potential of using various body circumference measurements to estimate stature among male and female participants from the Brahmin and Yadava communities of Lucknow.

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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 (B) and Yadava (Y) (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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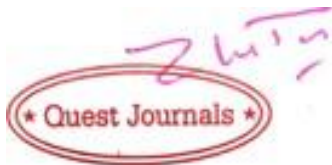……………………………………………
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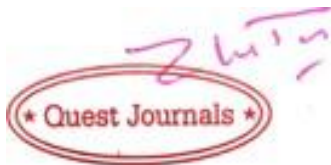Website: www.questjournals.org

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