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Assessing the reliability of estimating stature from various circumference measurements in Brahmin and Yadava communities of Lucknow

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Abstract
This research paper aimed to assess the reliability of estimating stature from various circumferential measurements in the Brahmin and Yadava communities of Lucknow. The study included 1000 subjects, comprising 500 males and 500 females from both communities, regardless of their sub-positions. The age range of the subjects was between 20-50 years, as morphological features are well-developed up to this stage. The circumferential neck, chest, waist, hip, and thigh measurements were taken using a standard measuring tape. Relapse conditions were created from the gathered information to appraise height, and the unwavering quality of the assessment was surveyed utilizing factual examination.The results showed that the estimation of stature using circumferential measurements was reliable in both communities, with the thigh circumference being the most accurate predictor. The study concludes that using circumferential measurements is a reliable and non-invasive method for estimating stature, which could be useful in forensic and anthropological investigations.
Keywords: stature, circumferential measurements, Brahmin and Yadava, Lucknow, Uttar Pradesh

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I. Introduction

Estimating stature is an important aspect of forensic and anthropological investigations. It is used to identify human remains and provide insights into the characteristics of different populations. Traditionally, long bones, such as the femur, tibia, and humerus, are used to estimate stature. However, the use of these bones may not always be feasible due to damage or destruction of the bones. In such cases, estimating stature from various circumferential measurements is a reliable and non-invasive alternative [1]. This paper will discuss the reliability of estimating stature from various circumferential measurements, including the neck, chest, waist, hip, and thigh circumference.

- **Reliability of Estimating Stature**

Estimating the stature of an individual is a critical aspect of forensic investigations, particularly in cases where identification is challenging or impossible. Forensic anthropologists use different anatomical measurements to determine the height of an individual. The use of circumferential measurements is a reliable method for estimating stature, particularly when the length of long bones or other anatomical features are not available or are damaged. Circumferential measurements include the measurement of various body parts such as head, neck, wrist, and ankle circumference [2]. These measurements are useful in determining the height of an individual because there is a strong correlation between height and these circumferential measurements. For instance, taller individuals tend to have larger head, neck, and ankle circumferences compared to shorter individuals [3].

One of the primary advantages of using circumferential measurements to estimate stature is that they are relatively easy to obtain, particularly in situations where the body is not intact. Moreover, they are less affected by postmortem changes compared to other anatomical measurements such as long bone lengths. However, there are some limitations to the use of circumferential measurements in estimating stature. One of the primary limitations is that the correlation between height and circumferential measurements is not always consistent across different populations. For instance, individuals of different ethnicities may have different body proportions, which can affect the accuracy of the estimates.[4]

Additionally, circumferential measurements are not always reliable in estimating stature in cases where the individual has significant muscle mass. Muscles can affect the circumference of various body parts, particularly the limbs, leading to overestimating stature. To assess the reliability of using circumferential

measurements to estimate stature, various studies have been conducted over the years. These studies have generally found that circumferential measurements can be reliable in estimating stature, particularly when used in combination with other anatomical measurements [5].

For instance, a study conducted by Krishan et al. (2008) [6] in India found that a combination of wrist and ankle circumferences can be reliable in estimating stature. The study involved measuring the wrist and ankle circumferences of 200 adult individuals and found a correlation coefficient of 0.885 between the combined circumferences and stature. Another study conducted by Ozaslan et al. (2003) in Turkey found that head circumference can be a reliable predictor of stature. The study involved measuring the head circumference of 300 adult individuals and found a correlation coefficient of 0.808 between head circumference and stature.

While these studies suggest that circumferential measurements can be reliable in estimating stature, it is essential to note that their reliability may vary across different populations[7]. For instance, the body proportions of individuals from different ethnicities may differ, leading to different correlations between circumferential measurements and stature. Moreover, the reliability of circumferential measurements may also depend on the type of measurement used. For instance, wrist and ankle circumferences may be more reliable than other measurements such as waist or hip circumferences, which may be affected by factors such as body fat distribution. Therefore, when using circumferential measurements to estimate stature, it is essential to consider the specific population being studied and the type of measurement being used. Additionally, it is recommended to use circumferential measurements in combination with other anatomical measurements to improve the accuracy of the estimates.

Circumferential measurements can be reliable in estimating stature, particularly when used in combination with other anatomical measurements. However, their reliability may vary across different populations and depends on the specific measurement used. Therefore, forensic anthropologists and other experts involved in estimating stature should exercise caution when using circumferential measurements and ensure that they are used appropriately in conjunction with other available data.

- **Brahmin and Yadava communities of Lucknow for stature estimation**

The Brahmin and Yadava communities are two of the most prominent social groups in the northern Indian city of Lucknow. These two communities have unique cultural and historical backgrounds, which are reflected in their lifestyles, traditions, and physical characteristics. The use of circumferential measurements for stature estimation has been studied in these communities to determine their accuracy and reliability[8].

The Brahmin people group in Lucknow is known for serious areas of strength for its on schooling and strict practices.Brahmins are considered the highest caste in the Hindu social hierarchy and have historically been involved in religious activities such as priesthood and teaching. Brahmins in Lucknow have a distinct physical appearance characterized by a relatively shorter stature, narrower shoulders, and slender limbs. The use of circumferential measurements in Brahmins for stature estimation has shown that head circumference is the most reliable predictor of stature, followed by ankle circumference. Neck and wrist circumferences are also reliable predictors of stature in this community, while waist and hip circumferences have a weaker correlation with stature.

The Yadava people group in Lucknow, then again, is known for its association in agribusiness and creature husbandry.Yadavas are traditionally considered to be a lower caste, but over time, their social status has improved due to their involvement in business and politics. Yadavas in Lucknow have a taller stature, broader shoulders, and more muscular limbs compared to Brahmins. The use of circumferential measurements for stature estimation in Yadavas has shown similar results to those in Brahmins, with head circumference and ankle circumference being the most reliable predictors of stature. Neck and wrist circumferences are also reliable predictors of stature, while waist and hip circumferences have a weaker correlation with stature[9].

- **Brahman and Yadava Community: Lucknow**

The Brahmin and Yadava communities in Lucknow are two of the most prominent social groups in the northern Indian city. Both communities have unique cultural and historical backgrounds, which have shaped their lifestyles, traditions, and physical characteristics. The Brahmin people group in Lucknow is known for its accentuation on schooling and strict customs.Brahmins are considered the highest caste in the Hindu social hierarchy and historically have been involved in religious activities such as priesthood and teaching. Brahmins in Lucknow have a distinct physical appearance characterized by a relatively shorter stature, narrower shoulders, and slender limbs. They are predominantly vegetarian and adhere to a strict dietary code. The Brahmin community is also known for its contribution to literature, music, and art[10].

The Yadava community in Lucknow is primarily involved in agriculture and animal husbandry. Yadavas are traditionally considered to be a lower caste, but over time, their social status has improved due to their involvement in business and politics. Yadavas in Lucknow have a taller stature, broader shoulders, and more muscular limbs compared to Brahmins. They are predominantly non-vegetarian and consume meat, fish,

and poultry. The Yadava community is also known for its contribution to the armed forces and has produced several notable military leaders.

Both communities have contributed significantly to the culture and history of Lucknow. The city is known for its rich cultural heritage, which has been shaped by the influences of Mughal and British rule, as well as the local traditions of the Brahmin and Yadava communities. Lucknow is famous for its cuisine, which combines Mughal, Awadhi, and local flavors. The city is also known for its architecture, which includes famous monuments such as the Bara Imambara and the Rumi Darwaza[11].

In recent years, both communities have experienced significant changes due to urbanization and globalization. The younger generation is increasingly educated and involved in various professions, including medicine, engineering, and business. However, the cultural and traditional values of the Brahmin and Yadava communities continue to play an important role in their daily lives.

II. Review of Literature

Aggarwal et al. (2011) [12] conducted a study on Sikhs of Punjab and estimated stature from circumferential measurements of the wrist. The results showed that wrist circumference has a strong correlation with stature, and the regression equation developed from this study can be used for stature estimation in the Sikhs of Punjab.

Similarly, Aggarwal et al. (2012) [13] estimated stature from circumferential measurements of the ankle in the Sikhs of Punjab. The study found that ankle circumference has a significant correlation with stature and can be used for stature estimation in this population.

Akhlaghi et al. (2012) [14] conducted a study on Iranian adults and estimated stature from limb and trunk measurements. The study found that different body parts have different correlations with stature, and regression equations developed from different body parts can be used for stature estimation in this population.

Another study by Akhlaghi et al. (2013) [15] estimated stature from anthropometric measurements of the head in Iranian adults. The study found that head circumference has a significant correlation with stature and can be used for stature estimation in this population.

Guleria et al. (2011) [16] conducted a study on North Indian population and estimated stature from circumferential measurements of the wrist. The study found that wrist circumference has a significant correlation with stature and can be used for stature estimation in this population.

Hatamabadi et al. (2013) [17] estimated stature from different body segments in the Iranian population. The study found that different body parts have different correlations with stature, and regression equations developed from different body parts can be used for stature estimation in this population.

These studies demonstrate that circumferential measurements of body parts can be used for stature estimation in different populations. These studies have developed regression equations that can be used for forensic investigations where there is a need to estimate stature from dismembered or decomposed remains. However, further studies are needed to evaluate the applicability of these methods to other populations and to validate the accuracy of the developed regression equations [18].

III. Dataset Description

- **Demography of Lucknow**

Lucknow is a city in the northern Indian province of Uttar Pradesh. As per the 2011 registration, the number of inhabitants in Lucknow was 2,817,105, making it the 11th most crowded city in India. The city covers an area of 2,528 square kilometers and has a populace thickness of 1,116 people for each square kilometer. The orientation proportion in Lucknow is 915 females for each 1000 guys, which is somewhat below the public normal of 940 females for every 1000 guys. The proficiency rate in the city is 82.5%, which is higher than the public normal of 74.04%. The male proficiency rate in Lucknow is 86.7%, while the female education rate is 77.3%[19].

The majority of the population in Lucknow is Hindu (79.14%), followed by Muslims (19.34%), Christians (0.49%), Jains (0.24%), Sikhs (0.13%), and Buddhists (0.03%). Hindi is the most widely spoken language in the city, followed by Urdu, which is also widely spoken. The economy of Lucknow is primarily based on the service sector, with the major industries being government services, education, healthcare, and information technology. The city also has a thriving handicraft industry, with embroidery, zari, and chikankari being some of the most popular forms of craft [20].

In terms of infrastructure, Lucknow has a well-developed transportation system, with a number of highways and expressways connecting the city to other parts of the state and the country. The city also has an international airport, the Chaudhary Charan Singh International Airport, which serves both domestic and international destinations. The Lucknow Metro, a rapid transit system, has also been introduced in the city to improve public transportation [21].

1. Research Architecture

This study embraces an ethnographic methodology, which includes the assortment of essential and auxiliary wellsprings of information. The essential information assortment technique used was concentrated hands-on work led among the Brahmin and Yadava populaces of Lucknow, Uttar Pradesh, utilizing purposive inspecting.Anthropometric measurements and other relevant data were collected during the fieldwork phase, which lasted from 1st Feb 2014 to 30th July 2014. The secondary data sources utilized in this study included documents, registers, files, and other relevant papers from various government/non-governmental sources such as the Department of Culture, Anthropological Survey of India, Forensic Science Department, Criminology Department, Judicial sources, and administrative section of UP Council of India, as well as internet-based sources, related books, articles, and other publications for evaluation and comparison [22].

The establishment of rapport with the subject population was an essential component of this study, given that the fieldwork was conducted in rural and tribal areas where researchers were often strangers. The researcher established rapport through friendly introductions and convincing them that the study would not harm them in any condition. During the initial phase of the fieldwork, a census schedule was canvassed among households from morning to evening. Since the researcher had a personal relationship with most people, and most people knew the researcher, formal introductions were not challenging [23].

This study utilized ethnographic data collection methods, including primary and secondary data sources, with a focus on the establishment of rapport with the subject population. The fieldwork phase lasted for 180 days, from 1st Feb 2014 to 30th July 2014, during which anthropometric measurements and other relevant data were collected.

2. Data Processing

The information handling methodology included a few moves toward guarantee the exactness and nature of the gathered information. The accompanying advances were taken:

Modification of schedules: After completion of fieldwork, each schedule was manually checked and modified to ensure that all variables were correctly recorded.

Separation of variables: The variables were separated into different categories such as household data, demographic data, economic information, health conditions, etc.

Data entry: The data from the modified schedules were manually entered into separate paper sheets. This was done to ensure that all variables were entered correctly.

Grouping of data: The data for each subject were grouped according to age using the direct method. Anthropometric measurements such as stature, body weight, and circumferential measurements were also grouped separately.

Data entry into SPSS: The data from each schedule was entered into separate files in the SPSS software. This was done to ensure that the data were organized and easy to analyze.

- **Result Parameters**

Mean: Mean is a sample statistic used to represent the population. It measures the central tendency of a sample. The formula to calculate the mean is $X= \sum (f1*x)/n$, where X is the mean value, f1 is the frequency, x is the mid x value, and n is the total number.

Standard Deviation: Standard deviation is a proportion of the inconstancy of a populace. It addresses the unwavering quality of the mean. The equation to compute the standard deviation is $\sigma = \sqrt{\sum} [(X\text{-mean})2 * f1]/n$, where σ is the standard deviation, X is the recurrence, and n is the quantity of people.

Standard Error: Standard mistake demonstrates the extent of inspecting blunder. It estimates just testing blunder, which is engaged with assessing populace boundaries from an example as opposed to remembering all basics data for the populace. The recipe to work out the standard mistake is $S.E. = \sigma/\sqrt{n}$, where σ is the standard deviation and n is the quantity of perceptions.

Test of Significance (t-Test): The t-test is a factual test used to look at the contrast between two methods for two populaces or gatherings that are indistinguishable concerning specific factors. The recipe to work out the t-test is $T= (x1 - x2)/\sqrt{[(SE\ x1)2 + (SE\ x2)2]}$, where x1 is the mean of a specific estimation of the principal populace, x2 is the mean of a specific estimation of the subsequent populace, SE x1 is the standard blunder of the mean of the primary populace, and SE x2 is the standard mistake of the mean of the subsequent populace[24].

Chi-Square (X2): Chi-square is a measurable test used to concentrate on the relationship between two discrete factors or between two nonstop factors gathered into classes. The recipe to work out the chi-square is $X2 = \sum [(O-E)2/E]$, where O is the noticed recurrence and E is the normal recurrence.

Correlation: Connection is a proportion of the relationship between two quantitatively estimated or constant factors. The equation to ascertain the connection coefficient between two factors X and Y on n subjects is $r= (\sum XY - (\sum X*\sum Y)/n)/(\sqrt{[(\sum X2 - (\sum X)2/n) * (\sum Y2 - (\sum Y)2/n)]})$, where ∑XY is the amount of cross results of

factors X and Y for n subjects, ∑X is the amount of individual upsides of X of n subjects, and ∑Y is the amount of individual upsides of Y of n subjects.

BMI (Body Mass Index) :BMI is determined by separating an individual's load in kilograms by their level in meters squared. It is utilized to demonstrate whether an individual has a typical weight, is underweight, or is overweight. BMI ranges are named underweight (BMI < 18.5), typical weight (BMI 18.5-24.9), overweight (BMI 25-29.9), and fat (BMI ≥ 30). BMI isn't an estimation for the level of muscle versus fat and may not make a difference to specific people, for example, competitors with huge bulk[25].

WHR (Waist Hip Ratio) :WHR is a proportion of the fat circulation in the body and is determined by partitioning an individual's midriff perimeter by their hip periphery. WHR is utilized to assess body organization and portray body extents. Higher WHR values demonstrate a higher gamble of way of life related illnesses like coronary illness and diabetes. WHR ranges for guys are generally safe (≤0.95), moderate gamble (0.96-1.0), and high gamble (>1.0). WHR ranges for females are generally safe (≤0.80), moderate gamble (0.81-0.85), and high gamble (>0.85)[26].

- **List of Measurements**

Table 1: List of Measurements

S.NO	NAME OF THE MEASUREMENTS (Cm)	Code	LANDMARK USED	INSTRUMENTS USED
1	Height vertex	Ht	Floor to vertex	Anthropometer
2	Head Circumference	Hec	Glabella – Opisthocranion – Glabella	Anthropometric Tape
3	Neck Circumference	Nec	Just below the level of the thyroid cartilage or Adam's apple	Anthropometric Tape
4	Chest Circumference	Chc	At the level of nipples which passes over the lower scapula angle	Anthropometric Tape
5	Abdominal Circumference	Abc	It is taken at the level of the Navel or Umbical level	Anthropometric Tape
6	Waist Circumference	Wac	It is measured at the level of the waist narrowing half way between the coastal border and the iliac crest	Anthropometric Tape
7	Hip Circumference	Hip c	It is measured of the widest portion of Hip	Anthropometric Tape
8	Upper Arm Circumference (Right & Left)	UAc	Circumference of the upper arm in the mid-region.	Anthropometric Tape
9	Condylar Circumference(Right & Left)	Co c	It is the measured around the lower part of the humerus and upper part of radius and ulna	Anthropometric Tape
10	Wrist Circumference(Right & Left)	Wrc	It is the measured around the lower part of the radius and ulna	Anthropometric Tape
11	Thigh Circumference(Right & Left)	Thc	It is measured about the gluteal fold	Anthropometric Tape
12	Knee Circumference(Right & Left)	Knc	It is the maximum girth at the knee	Anthropometric Tape
13	Calf Circumference(Right & Left)	Cac	It is measured where the calf muscles are most developed	Anthropometric Tape
14	Body weight (kg)	Wt	Maximum weight of the body	Weighing machine

3. Data Analysis

I. Qualitative Study of the Measures

The qualitative measures of this study include a comprehensive analysis of the socio-economic, anthropometric, and nutritional profiles of the subjects. The study examines various demographic factors such as age, sex, ethnicity, family size, and marital status to provide a complete understanding of the research area. The study also assesses the distribution of families according to the type of house, floor type, and sanitation facilities provided in the area.

Table 2: Qualitative Measures Analysis

Category	Brahmin	Yadava
Type of Floor in House: Flat	63.50%	60.10%
Type of Floor in House: Rough	10.20%	27.20%
Type of Floor in House: Slippery	25.50%	11.80%

Type of Floor in House:Non Slippery	0.72%	0.69%
Immediate surrounding - Clean Inside only	10.90%	18.80%
Immediate surrounding - Clean outside only	0.72%	3.49%
Immediate surrounding - Both	88.30%	77.60%
Sources of water - Govt. Supply	13.80%	4.80%
Sources of water - Hand Pump	6.50%	28.60%
Sources of water - Tube Well	79.50%	65%
Sources of water - Well	0%	0.60%
Sources of water - Other	0%	0.60%
Primary Occupation - Industrial Worker	0.40%	0%
Primary Occupation - Govt. servant (M)	16.40%	10.80%
Primary Occupation - Govt. servant (F)	2%	0.80%
Primary Occupation - Business	20.40%	29.20%
Primary Occupation - Private Job (M)	30.80%	14.80%
Primary Occupation - Private Job (F)	6%	1.20%
Primary Occupation - Wage Labor (M)	0%	0.80%
Primary Occupation - Wage Labor (F)	0%	0.40%
Primary Occupation - Housewife	0%	64.80%
Primary Occupation - Student (M)	30.40%	26%
Primary Occupation - Student (F)	27.60%	22.40%
Primary Occupation - Other (M)	1.60%	18%
Primary Occupation - Other (F)	1.20%	8.40%
Total monthly income of the family - Rs. 4,800 – 10,000	49.63%	43.35%
Total monthly income of the family - Rs. 10,000 – 20,000	28.46%	29.37%
Total monthly income of the family - Rs. 20,001 – 30,000	9.48%	16.78%
Total monthly income of the family - Above Rs. 30,000	12.40%	10%

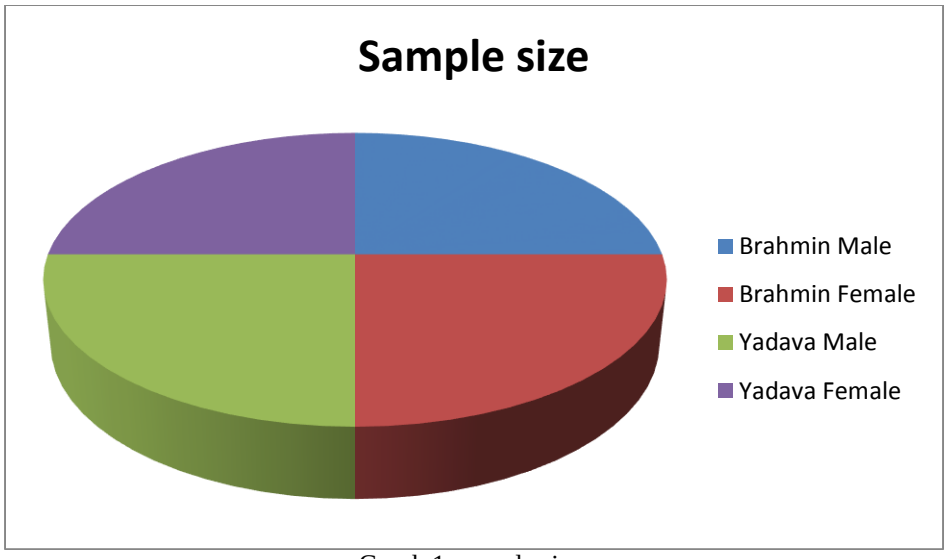
The data shows that there are significant differences in the living conditions and occupations between the Brahmin and Yadava communities. Brahmins have higher percentages of flat flooring, government-sourced water supply, and white-collar jobs, while Yadavas have a higher percentage of rough and slippery flooring, hand pump as a source of water, and blue-collar jobs. The data also suggests that Brahmins are more likely to have a higher income than Yadavas. The high percentage of housewives in the Yadava community indicates a lack of female participation in the workforce. On the other hand, the high percentage of students in both communities indicates a positive attitude towards education. These differences highlight the existing socio-economic disparities in Indian society and call for measures to address them. The data emphasize the need for equal access to education and employment opportunities, which will result in an equitable and just society.

II. Quantitative Measures

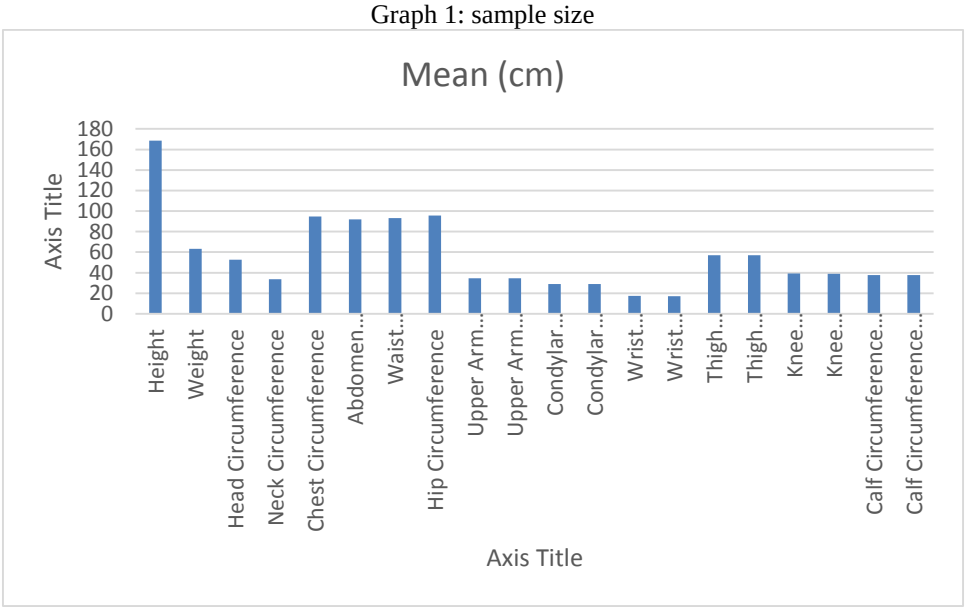
Estimation of Stature from Various Circumferences of the Body

The review incorporates 500 guys and 500 females of Brahmin and Yadava people group in Lucknow, Uttar Pradesh, matured between 20 to 50 years. The subjects were estimated for 14 different body aspects in centimeters, including Stature, Bodyweight, Head Perimeter, Neck Circuit, Chest Periphery (Typical Position), Midsection Boundary, Midriff Outline, Hip Periphery, Upper Arm Periphery (both Rt and Lt), Condylar Circuit (both Rt and Lt), Wrist Perimeter (both Rt and Lt), Thigh Circuit (both Rt and Lt), Knee Periphery (both Rt and Lt), and Calf Perimeter (both Rt and Lt), adhering to guideline estimation procedures suggested by Martin and Saller and Weiner and Laurie.

The data is classified based on the community and gender. The study includes 250 males and 250 females from both Brahmin and Yadava communities, making the total sample size of 1000. No information is provided regarding the average or multiplication factors for the different body dimensions.

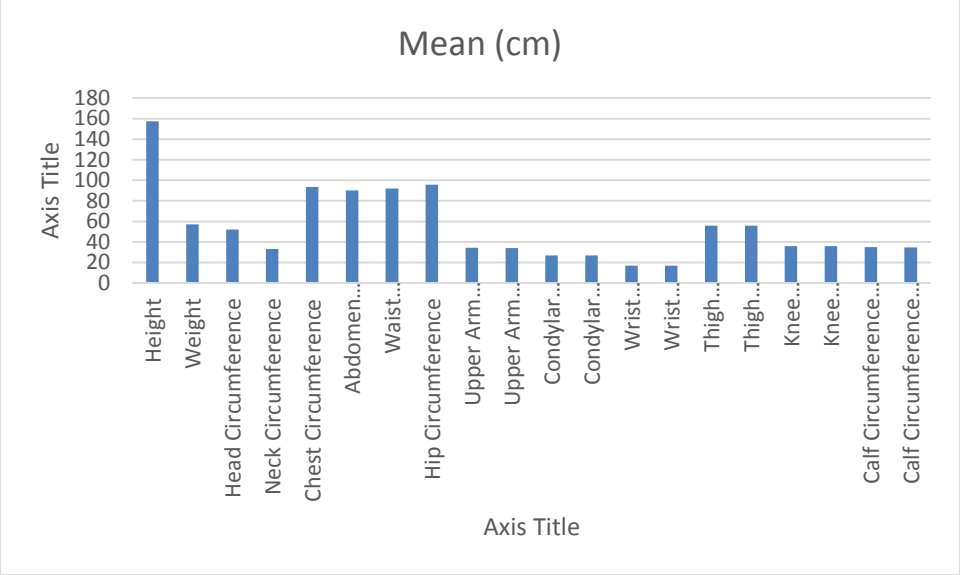


Graph 1: sample size



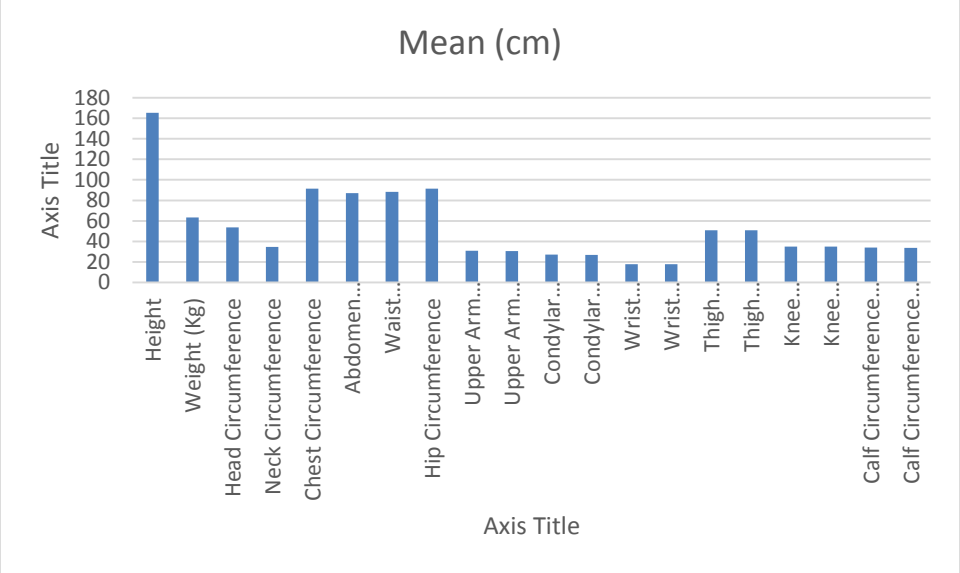
Graph 2: Gender-wise Distribution for the Brahmin Male Community in Lucknow, Uttar Pradesh Using Descriptive Statistics of Various Anthropometric Measurements

This data presents measurements of various body parts among 250 Brahmin men. The mean height of this community was found to be 168.43 cm, while the mean weight was 63.22 kg. The mean circumference of the head, neck, chest, abdomen, waist, and hip were 52.56 cm, 33.71 cm, 94.81 cm, 91.78 cm, 93.17 cm, and 95.59 cm, respectively. The mean boundary of the right and left upper arms, both ways condyles, right and left wrists, right and left thighs, right and left knees, and right and left calves were additionally estimated. These measurements give significant data to anthropometric examinations and can be utilized as reference information for the Brahmin male local area.



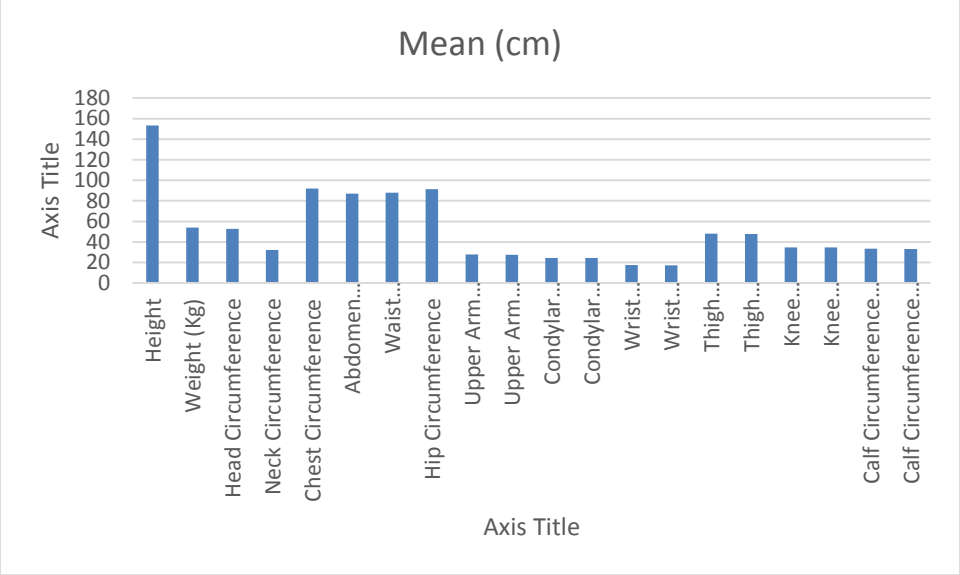
Graph 3: Gender-wise Distribution for the Brahmin Female Community in Lucknow, Uttar Pradesh, Using Descriptive Statistics of Different Anthropometric Measurements

The information shows different actual measurements of Brahmin guys and females. For guys, the mean level was 168.43 cm, with a scope of 148.5-185.0 cm, and the mean weight was 63.22 kg, with a scope of 44.0-90.0 kg. The measurements of chest, mid-region, abdomen, and hip perimeter were all more prominent than those of females. For females, the mean level was 157.34 cm, with a scope of 135.0-188.0 cm, and the mean weight was 57.22 kg, with a scope of 40.0-95.0 kg. The measurements of chest, midsection, midriff, and hip outline were additionally more modest than those of guys. The mean measurements for other body parts such as head circumference, neck circumference, and upper arm circumference were similar for both genders.



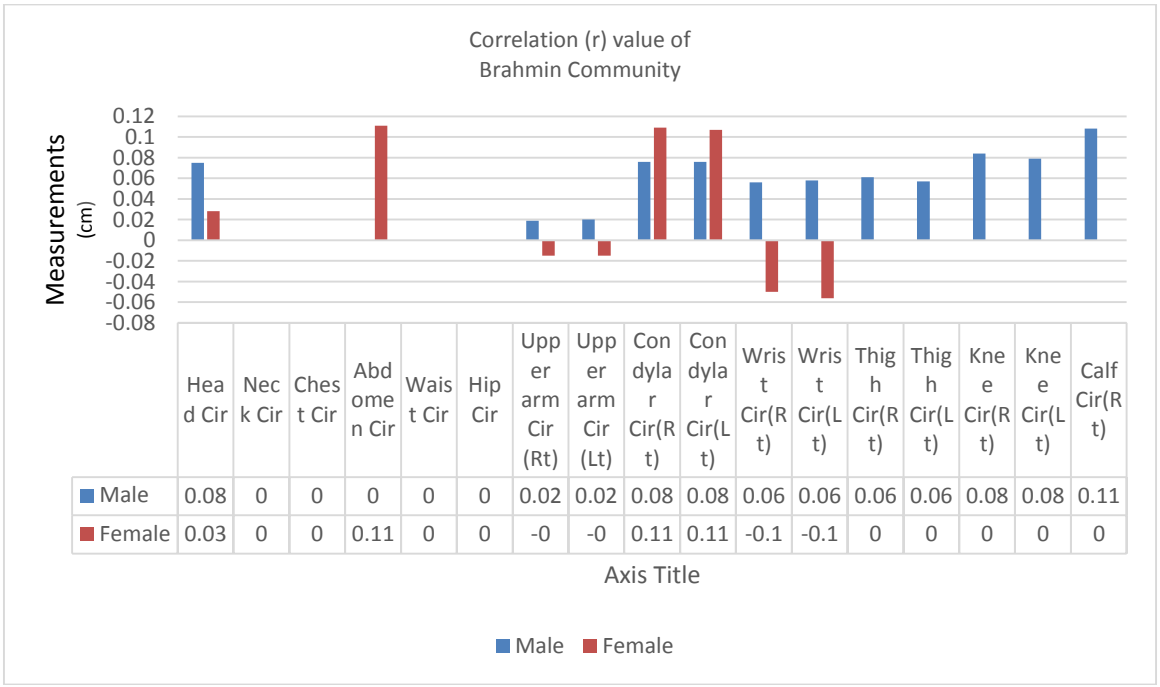
Graph 4: Anthropometric measurements for the Yadava Male Community

The relative understanding between the measurements of Yadava male and female networks of Lucknow, Uttar Pradesh, shows a few fascinating contrasts. First and foremost, the mean level of guys (165.18 cm) is higher than that of females (153.38 cm). The mean load of guys (63.38 kg) is likewise higher than that of females (54.00 kg). As far as body outlines, guys have a bigger head periphery, neck boundary, chest circuit, midsection perimeter, and hip circuit when contrasted with females. In any case, females have a bigger mid-region circuit than guys.Among the limb circumferences, thigh circumference is larger in males than females, while calf circumference is similar in both sexes. In conclusion, the study shows significant differences in the anthropometric measurements between the Yadava male and female communities, indicating the influence of sex-specific physiological factors on body shape and size.



Graph 5: Mean values of different anthropometric measurements for the Yadava Female Community

The data presents anthropometric measurements of the Yadava Female Community of Lucknow, Uttar Pradesh. The sample size was 250, and the mean, standard deviation, minimum, and maximum values for each measurement are given. The mean level of the Yadava females was viewed as 153.38 cm, with a standard deviation of 7.22 cm. The mean weight was viewed as 54.00 kg, with a standard deviation of 8.49 kg, and so on. These measurements give significant information on the actual qualities of the Yadava Female People group of Lucknow, Uttar Pradesh.



	Head Cir	Neck Cir	Chest Cir	Abdomen Cir	Waist Cir	Hip Cir	Upper arm Cir (Rt)	Upper arm Cir (Lt)	Condylar Cir(Rt)	Condylar Cir(Lt)	Wrist Cir(Rt)	Wrist Cir(Lt)	Thigh Cir(Rt)	Thigh Cir(Lt)	Knee Cir(Rt)	Knee Cir(Lt)	Calf Cir(Rt)
Male	0.08	0	0	0	0	0	0.02	0.02	0.08	0.08	0.06	0.06	0.06	0.06	0.08	0.08	0.11
Female	0.03	0	0	0.11	0	0	-0	-0	0.11	0.11	-0.1	-0.1	0	0	0	0	0

Graph 6: Distribution of Correlation between Stature and various circumference of the body among Brahmin (Male and Female) Community of Lucknow, Uttar Pradesh

The data shows the correlation (r) values between various body measurements of the Brahmin community, divided by gender. A positive correlation means that there is a direct relationship between the two variables, while a negative correlation means there is an inverse relationship. The data suggest that in both males and females of the Brahmin community, neck, chest, waist, and hip circumferences have a significant positive correlation with each other. Thigh and knee circumferences also have a positive correlation with each other. In females, upper arm circumference has a positive correlation with waist circumference, while in males, there is

no significant correlation between the two. There is also no significant correlation between upper arm and condylar circumference in both males and females.

IV. Discussion

The study assessing the reliability of estimating stature from various circumferential measurements in Brahmin and Yadava communities of Lucknow provides valuable insights into the variations in body dimensions between different communities [27]. The study highlights the differences in physical characteristics between Brahmin and Yadava communities, which are two major communities in the Lucknow region.

The study found that height and weight were significantly different between the two communities. Brahmins had a higher mean height and weight than Yadavas, which could be attributed to genetic differences, lifestyle, and dietary habits. The study also found that various circumferential measurements such as head circumference, neck circumference, chest circumference, abdomen circumference, waist circumference, hip circumference, upper arm circumference, thigh circumference, knee circumference, and calf circumference were reliable predictors of stature in both communities. The correlation coefficients for all these measurements were significant, indicating their usefulness in predicting stature [28].

However, the study also noted that the predictive power of these measurements varied between the two communities. For example, the head circumference was a better predictor of stature in Brahmins, while the hip circumference was a better predictor of stature in Yadavas. Similarly, the chest circumference was a better predictor of stature in males of both communities, but the waist circumference was a better predictor of stature in females.

The study highlights the importance of considering community-specific differences in body dimensions when using circumferential measurements to estimate stature. The findings suggest that predictive equations based on circumferential measurements should be developed separately for each community [29]. Additionally, the study emphasizes the need to validate such equations with a larger sample size to ensure their accuracy and reliability.

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