

## A Study of Anthropometric Assessment of Schedule Caste and Schedule Tribe Boys of Chhattisgarh

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### ABSTRACT

**Objective:** To compare anthropometrical changes and evaluate overall growth and health status between SC and ST boys among medical students. **Methods:** This is a cross-sectional observational study done at the Department of Anatomy, Pt. J. N. M. Medical College, Raipur, from year 2018 to 2019. A total of 100 (50 SC and 50 ST) apparently healthy boys were recruited. Informed consent was obtained. **Result:** Mean Weight of ST was 56.2, and SC was 67.78, stature of ST was 167.476, and SC was 170.268; sitting height of ST was 83.964, and SC was 87.004; the lower extremity length of ST was 83.512, and SC was 83.264, and body mass index (BMI) of ST was 20.058, and SC was 24.024. The upper limb length of ST was 71.786, and SC was 74.928; the arm length of ST was 32.924 and SC was 33.696; the mid-upper arm circumference of ST was 25.06, and SC was 28.144; the maximum calf circumference of ST was 32.808 and SC was 34.784. Head circumference of ST was 55.186 and SC was 54.988, Breadth of ST was 14.602 and SC was 14.384, Length of ST was 18.574 and SC was 18.916. The Cephalic Index of ST was 79.008, and SC was 76.244. **Conclusion:** The weight, stature, sitting height, BMI, upper limb length, total arm length, mid-upper arm circumference, maximum calf circumference, and head length revealed greater in SC than in ST boys. The lower extremity length, head circumference, and head breadth among ST were more than SC Boys. The cephalic index of both communities was mesocephalic.

### Introduction

Anthropometry is the measurements of the human body and systematic correlation, which is the principal technique of physical anthropology.<sup>1</sup> India is characterized by a wide diversity of populations. A recent estimate suggests that there are at least 4635 communities comprising castes, subcastes, and tribes of diverse ethnic, linguistic, religious, and cultural stocks in different geographical regions of the country, which consists of several socially disadvantaged communities like scheduled caste and scheduled tribes.<sup>2</sup> These communities are susceptible to undernutrition. WHO in developing countries has estimated that around 245 million adults are moderately underweight and 93 million severely underweight. At the same time, there are over 200 million adults who are moderately or severely overweight of whom 58 million are in developing countries.<sup>3</sup> Several studies were conducted in the pediatric age group for nutritional assessment in scheduled castes who have poor nutritional status due to their disadvantaged socio-economic status; therefore, the present study was planned to conduct this study to compare anthropometrical changes like height, weight, and head circumference to evaluate overall growth and

health status between SC and ST boys of a larger age group i.e. among 1st-year medical students who are the potential human resource of future.<sup>4</sup> The objective of this study was to compare the following anthropometrical changes and evaluate overall growth and health status between SC & ST boys among medical students: Stature, weight, BMI, sitting height, lower extremity length, maximum calf circumference, upper limb length, arm length, mid-upper arm circumference, head circumference, head length, head breadth, and cephalic index.

### Methods & Materials<sup>4,5</sup>

This was a cross-sectional observational study. The present study was carried out on first year medical students, a total of 100 subjects (50 SC and 50 ST) in the Department of Anatomy, Pt. J. N. M. Medical College, Raipur, from year 2018 to 2019. The materials required for the study were a stadiometer for measuring stature, sitting height, upper limb and arm length, a spreading caliper for measuring the head length and head breadth, a portable weighing machine for

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measuring body weight, and a measuring tape for measuring mid upper arm circumference, mid-calf circumference and head circumference.

Subjects were explained about the nature of study, written and informed consent was obtained prior to the commencement of the examination. Apparently, healthy SC and ST male students of Pt. J. N. M. Medical College, Raipur, Chhattisgarh belonging to the first year of the medical curriculum, was included in the present study.

Weighing was done using a portable weighing machine, with the subject wearing minimum clothes on a weighing machine. The subject was asked to stand on the weighing machine, and the weight was recorded to the nearest 0.5 Kg. Stature was measured using a stadiometer, and the subject was asked to stand on a plane surface against the wall with his heels together, stretching upwards to the fullest extent, added by gentle traction on the mastoid process. The horizontal arm of the stadiometer was brought down to the subject's head while keeping the instrument vertical. The reading was taken to the nearest 0.1 cm. The sitting height was measured using a Stadiometer with the back stretched as with the back of sacral and interscapular region. He is on a tabletop with his feet hanging down unsupported over the edge. The subject was asked to keep the knees above the edge of the table. Gentle traction was applied under the chin, and subject was asked to relax the muscles of thighs and buttocks. The head was held in Frankfort plane (the horizontal line from the ear canal to the lower border of the orbit of the eye is parallel to the floor and perpendicular to the vertical backboard), and the Stadiometer was held vertically in contact with the back of the sacral and interscapular region. Upper limb Length was measured using a Stadiometer with the subject's arm and hand fully extended by his side; the tip of one arm of the Stadiometer was placed at the inferior border of acromion process. The distance to the tip of the longest finger was measured. Arm length was measured using a stadiometer, and the measurement was taken from the tip of acromion and the olecranon process at flexed 90°. Mid-arm Circumference was measured using a measuring tape, and the measurement was taken with the left arm hanging relaxed just away from his side and the circumference was taken horizontally at the marked level, which is midway between the tip of the acromion and the olecranon process. Total lower extremity length was obtained indirectly from each subject by subtracting the sitting height from his stature. The maximum calf circumference was measured using a measuring tape, and the subject was asked to sit on a table with the legs hanging freely. Maximum circumference was obtained by moving the tape vertically up and down. The measurement was taken at right angles to the axis of the lower leg. Head Length was measured using a spreading calliper, and the maximum length in mid-sagittal plane from glabella (the most silent point between the eyebrows) to opisthocranium (most silent on the occiput). Pressure was exerted to compress the tissue. Head breadth was measured using a spreading caliper, and the maximum breadth in the transverse plane; wherever it occurs, pressure was exerted to compress the tissue. Head circumference was measured using a measuring tape, and it

was measured from the occipital protuberance in back and supraorbital ridges in front and above the upper border of the ear laterally. The cephalic index is calculated as head breadth divided by the head length multiplied by one hundred. BMI was calculated using the standard Adolphe Quetlet formula, whereby the bodyweight in kilograms was divided by height in meters squared. The statistical analysis, comparison, and interpretation of the data were done.

## Result

Analysis of various body dimensions and the nature of the distance curves reveal that the mean values of the different body measurements represented a more or less increasing trend with advancement in age. The rate of increase was, however, not uniform in all the age groups and in all the characters.<sup>6</sup> It was observed that the mean weight of ST was 56.2 and SC was 67.78, the stature of ST was 167.476, and SC was 170.268, and the BMI of ST was 20.058 and SC was 24.024.

Similarly, the sitting height of ST was 83.964, and SC was 87.004; the upper limb length of ST was 71.786, and SC was 74.928, and the arm length of ST was 32.924 and SC was 33.696; and the lower extremity length of ST was 83.512, and SC was 83.264.

## Discussion

Majumder et al. (1990) found significant anthropometric variation among different regional groups; however, such patterns have not been observed across geographical regions, but stature and head or cranial measurements are sufficient to investigate the overwhelming proportion of anthropometric variation among the Indian populations across geographical

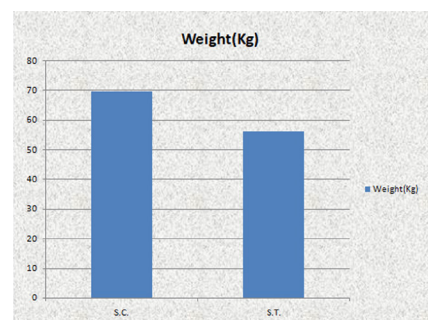


Fig. 1: Mean weight (in Kg) among the SC and ST boys

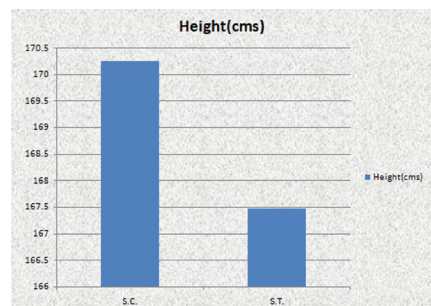


Fig. 2: Mean height (in cm) among the SC and ST boys

Table 1: Comparison of anthropometric assessment of scheduled caste and scheduled tribe boys of Chhattisgarh

| Parameters     | S.T. Boys       | S.C. Boys       |
|----------------|-----------------|-----------------|
| Weight (Kg)    | 56.2 ± 8.201    | 69.78 ± 13.882  |
| Height(cms)    | 167.476 ± 7.326 | 170.268 ± 5.329 |
| B.M.I.         | 20.058 ± 2.816  | 24.0249 ± 4.547 |
| U.L. Length    | 71.786 ± 13.704 | 74.928 ± 2.879  |
| Arm Length     | 32.924 ± 2.041  | 33.696 ± 1.917  |
| M.U.A.C.       | 25.06 ± 2.754   | 28.144 ± 3.526  |
| Sitting Height | 83.964 ± 11.231 | 87.004 ± 3.377  |
| L.L. Length    | 83.512 ± 12.338 | 83.264 ± 3.118  |
| Calf Circum.   | 32.808 ± 2.857  | 34.784 ± 3.356  |
| Head Circum.   | 55.186 ± 1.587  | 54.988 ± 4.138  |
| Head Breadth   | 14.602 ± 1.056  | 14.384 ± 0.702  |
| Head Length    | 18.574 ± 0.997  | 18.916 ± 0.902  |
| Cephalic Index | 79.008 ± 9.479  | 76.244 ± 5.70   |

zones and ethnic categories.<sup>7</sup> The mid-upper arm circumference of ST was 25.06, and that of SC was 28.144, and the mid-calf circumference of ST was 32.808, and SC was 34.784. Basu et al. (1980) found a significant association between climate and cephalic index; especially higher indexes were found among cold Himalayan and sub-Himalayan regions. The anthropometric parameters show significant variation with the caste and tribes in different

regions. Based on 82 populations and seven anthropometric traits and accounting for the limitations of the data by statistical treatment.<sup>8</sup> In this present study, it was found that the head length of ST was 18.574 and SC was 18.916, the head breadth of ST was 14.602, and SC was 14.384, and the head circumference of ST was 55.186, and SC was 54.988, and the cephalic index of ST was 79.008, and SC was 76.244. Inadequate food habits, along with traditional socio-cultural

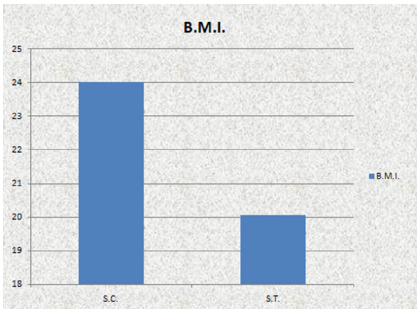


Fig. 3: Mean BMI (in Kg/m2) among the SC and ST boys

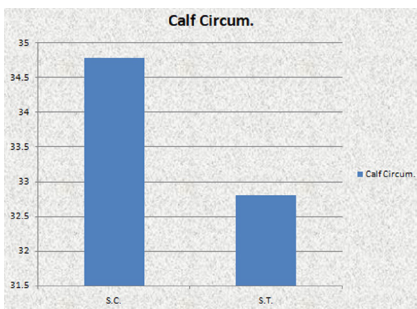


Fig. 5: Mean MCC (in cm) among the SC and ST boys

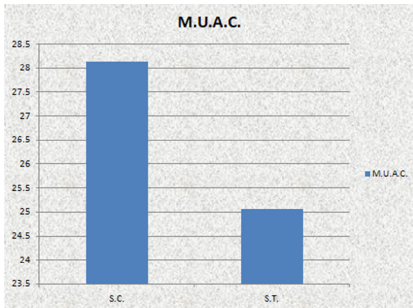


Fig. 4: Mean MUAC (in cm) among the SC and ST boys

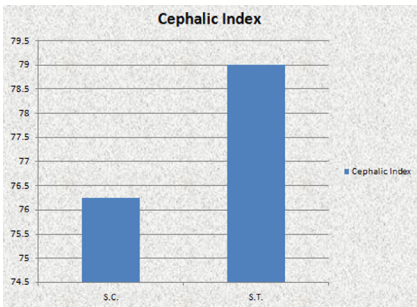


Fig. 6: Mean cephalic index among the SC and ST boys

and biological activities, may lead to a high proportion of children undernutrition. R. Patel et al. found that children belonging to 'lower' castes have poor nutritional status due to their disadvantaged socio-economic status and that of the total sample size, 67% of children were stunted (based on HAZ), 74.8% of children were underweight (based on WAZ), 57.3% children were malnourished (based on BMI), and 48% were underfed (based on daily calorie intake).<sup>4</sup> In almost all the measurements, malnutrition was biased toward boys in general. As the students come from different geographical areas, local climate may also play a role in their health status. There could be some genetic predisposition as well as geographical and environmental factors that may be responsible for such outcomes.

### Conclusion

The weight, stature, sitting height, BMI, ULL, Total arm length, MUAC, MCC, and Head Length were revealed to be greater in SC than in ST boys. Lower extremity length, head circumference, and head breadth among ST were more than among SC Boys. The cephalic index of both communities was mesocephalic.

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