A STUDY ON ANTHROPOMETRY MESEASUREMENT IN URBAN TRIBAL AND NON-TRIBAL BOYS' OF MALWA REGION INDORE

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Abstract

Background: There is not enough knowledge regarding how indigenous children and youth develop and mature. Children from Indore's indigenous communities don't have particularly impressive profiles for growth studies and motor skills. For teenage indigenous children, there are currently no easily accessible norms for body size, motor function. **Objective of study:** present study was to evaluate growth and physical development of the tribal and non-tribal boys. **Methods and materials:** The present study was performed on 300 participants, collected from the different institutes of Malwanchal university, Indore, Madhya Pradesh. **Discussion and conclusion:** Between the pre-pubertal urban tribal and non-tribal boys and the post-pubertal urban tribal and non-tribal boys, there were substantial disparities in the anthropometric characteristics.

Keywords: Puberty, Tribal and Non-tribal

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INTRODUCTION

The world's largest tribal population resides in India. According to the 2001 census, there were 84.33 million tribal people in India, or roughly 8.20 percent of the total population. The number of tribes was estimated at 635 groupings, although the census of 2001 recognized 461 groups as tribes. India's tribal population is more heavily concentrated in rural than urban areas. According to the 2001 census, indigenous people made up more than 10% of the country's rural population, compared to less than 2.5% of people living in urban areas. India's central and northeastern regions are home to the majority of the nation's tribal people[1].

Although the overall pattern of healthy growth is generally consistent from person to person, there is significant individual variation in the size attained and the pace of growth at different ages, both in terms of the body as a whole and its various sections. Therefore, it is necessary to measure both the entire body and its constituent components, and measurements are, in many ways, synonymous with the study of growth. The evaluation is more trustworthy if we look at the findings of global or regional growth studies, even though individual growth and development is the objective mirror of the link between the hereditary and environmental elements that influence on this complex process. The regional distribution of the published data reveals a significant amount of diversity. Europe is the most extensively mapped region in this regard because it is made up of mostly tiny nations with rather uniform racial and ethnic compositions. However, for countries like China, Russia, or the United States of America, for example, there are no comprehensive, representative growth studies.

The combination of genes, hormones, and nutrients maintains the integrated nature of development and maturation, it would seem (as one of the dominant components of the environment). There are clear environmental sources of variance in growth and maturation since these interact not only with one another but also with the contexts in which the child lives. The benefits of exercise are frequently acknowledged. The socioeconomic position of the family, a history of disease, the size of the family, and the climate are additional environmental factors that may have an impact on a person's growth and maturation.

It is crucial to take note of patterns in physical activity during childhood and adolescence that are related to age and sex in order to assess the impact of regular physical activity in growth and maturation. Results of surveys of older children and activity monitoring of young children give some indicators of the amount of time spent engaging in physical activity, but they typically do not provide information on the intensity, energy expenditure, or type of activity.

Sex, race, various environmental stresses acting on the growing and maturing individual, nutritional intake, infant and childhood illnesses, patterns of physical activity, and other environmental stresses can all have an impact on a person's growth, maturation, and development. These environmental stresses can also interact with a person's genetic potential for growth and maturation. The end consequence is a great deal of individual variety [2,3,4,5,6].

Statement of the problem

There is not enough knowledge regarding how indigenous children and youth develop and mature. Children from Indore's indigenous communities don't have particularly impressive profiles for growth studies and motor skills. For teenage indigenous children, there are currently no easily accessible norms for body size, motor function.

Hypothesis

The present study was a significant contribution to health research through its scientific application and interpretation because there is a dearth of literature disclosing comprehensive studies on growth pattern, motor ability, and physical fitness of tribal boys of Indore. The nature of these features in them was made clear by this investigation. The status of the tribal boys of Indore in this regard was reflected in a comparison of the data with other national statistics gathered by other investigators. Additionally, these were useful in identifying tribe youngsters with athletic and sporting ability. The findings could reveal a brand-new relationship between some already known facts in the aforementioned scenario. Through a rigorous examination of the outcomes, it was furthermore possible to draw attention to several fresh, noteworthy interpretations.

The findings may also offer useful baseline information for sports and fitness coaches who are interested in adolescent youth's physical characteristics for the purpose of identifying talent, tracking the effectiveness of training regimens, and making scientific predictions about adult performance that are specific to their sport. The findings of this study may offer valuable information for therapeutic decision-making regarding the sizes, ratios, and proportions unique to the population of children in Indore. These choices could involve figuring out the proper medicine dosages and dietary needs based on age.

METHODS AND MATERIALS

A cross-sectional study carried out among the tribal and non-tribal boys in the Department of Physiology of Index Medical College and research center, Indore (MP). **C**ollected from the different institutes of Malwanchal university, Indore, Madhya Pradesh. Data was collected by the purposive random sampling. One of the objectives of the present study was to evaluate growth and physical development of the tribal and non-tribal boys of Malwa region Indore through cross-sectional study.

Following anthropometric measurements were made on them to study the growth and physical development

a) Height in cm

b) Weight in kg

c) Mid upper arm circumference (MUAC), circumferences of thigh, chest and calf in cm

d) Bone width (biepicondylar breadth of the humerus and femur) in cm

e) Total skinfold thickness (TST) in mm

f) Body fat percentage

Results and Discussion:

Table 1. Comparison of the anthropometric variables of pre-pubertal tribal boys and non-tribal boys

Variables	Tribal Boys (n=150)	Non-Tribal Boys (n=150)	p-Value
Age (years)	12.0±0.8	12.2±0.8	
Height (cm)	139.6±5.9	142.7±6.1	<0.01
Weight (kg)	28.3±4.6	31.2±5.0	<0.01
Circumference MUAC (cm)	19.1±2.0	18.5±2.0	<0.01
Thigh (cm)	34.0±3.2	31.7±2.3	<0.01
Chest (cm)	65.4±4.1	63.9±4.3	<0.01
Calf (cm)	26.9±2.9	25.4±2.6	<0.01
Biepicondylar breadth of the humerus (cm)	5.40±0.54	5.08±0.50	<0.01
Biepicondylar breadth of the femur (cm)	7.50±0.93	7.26±0.81	<0.05
TST (mm)	25.2±2.1	27.5±2.3	<0.01
Body fat (%)	11.52±1.63	13.25±1.72	<0.01

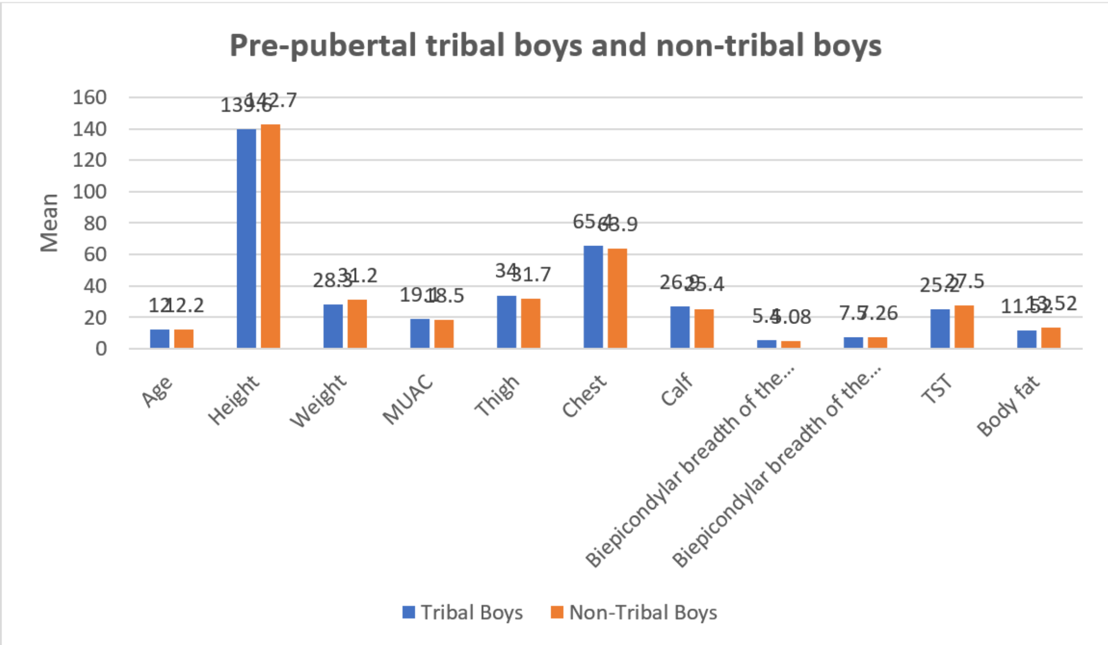

Figure 1. Comparison of the anthropometric variables of pre-pubertal tribal boys and non-tribal boys

Table 2. Comparison of the anthropometric variables of post-pubertal tribal boys and non-tribal boys

Variables	Tribal Boys (n=150)	Non-Tribal Boys (n=150)	p-Value
Age (years)	15.5±1.2	15.7±1.2	
Height (cm)	158.0±4.7	160.6±4.6	<0.01
Weight (kg)	41.4±4.0	43.2±6.6	<0.01
Circumference MUAC (cm)	21.1±2.2	19.4±2.0	<0.01
Thigh (cm)	44.5±2.1	42.3±2.5	<0.01
Chest (cm)	75.3±3.4	74.7±3.7	<0.01
Calf (cm)	33.0±2.4	30.7±2.7	<0.01
Biepicondylar breadth of the humerus (cm)	6.3±0.29	6.0±0.57	<0.01
Biepicondylar breadth of the femur (cm)	8.80±0.67	8.0±1.0	<0.05
TST (mm)	28.2±2.3	30.9±3.4	<0.01
Body fat (%)	12.19±1.6	14.28±2.2	<0.01

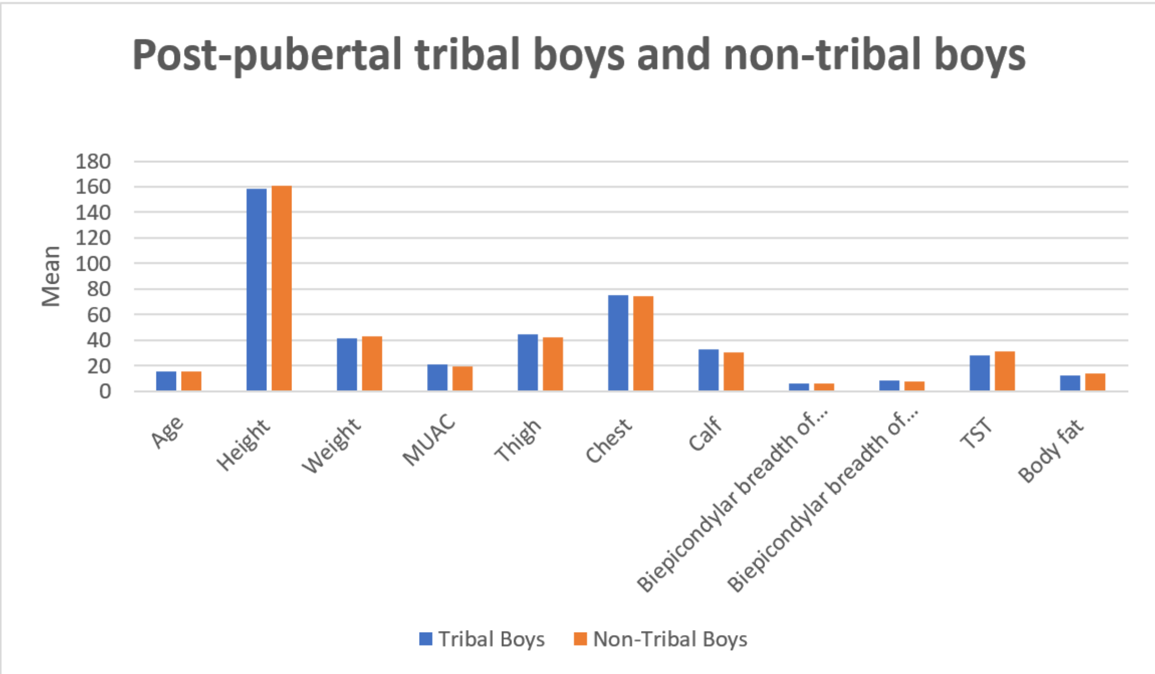

Figure 2. Comparison of the anthropometric variables of post-pubertal tribal boys and non-tribal boys

Height measurements

This was observed that the average (mean ± SD) body heights in pre-pubertal for tribal 139.6±5.9 and non-tribal 142.7±6.1 and in post-pubertal for tribal 158.0±4.7 and non-tribal 160.6±4.6. The pubertal difference between tribal and non-tribal boys, which was 2.0% at the pre-pubertal stage and 1.60% at the post-pubertal stage, had no effect on the magnitude of the difference.

The height of tribal and non-tribal boys increased with age significantly. The mean height increased from 127.5cm ± 2.2 at 10 years to 159.0cm ± 4.1

at 16 years in tribal boys (Average growth in height 5.25cm/year) and 130.2cm ± 2.0 at 10 years to 163.5cm ± 2.8 at 16years in non-tribal boys (Average growth in height 5.55cm/year). As a result, both groups experienced roughly the same average rate of height increase. Boys from tribal groups were found to be substantially shorter in height than boys from non-tribal groups. The degree of height difference initially noted, i.e. at 10 years of age, remained almost the same at 16 years of age since the pace of growth in both tribal and non-tribal males remained roughly the same.

Weight measurements

The body weights of tribal boys were significantly lower than the non-tribal boys. This was observed that the average (mean ± SD) body weights in pre-pubertal for tribal 28.2±4.7 and non-tribal 30.5±5.1 and in post-pubertal for tribal 41.4±4.0 and non-tribal 43.2±6.6.

Boys from both tribal and non-tribal backgrounds saw considerable increases in body weight with age, with average annual growth rates of 3.5 kg and 3.9 kg for tribal and non-tribal boys, respectively. Due to the relatively higher rate of weight gain in the post-pubertal stage in tribal boys (4.5kg/year) as compared to that in non-tribal boys (4.2kg/year), the magnitude of the difference between tribal and non-tribal boys during the pre-pubertal stage was 8.1%, while this difference decreased to 4.3%. Therefore, it is clear that puberty impacts the rate of weight gain substantially more quickly in tribal boys and lessens the size of the disparity in body weight at the post-pubertal stage.

Body circumferences measurement

Boys from both tribal and non-tribal backgrounds had their mid upper arm circumference (MUAC), thigh circumference, and calf circumference assessed as a measure of their nutritional condition and growth. The findings showed that tribal boys' circumferences were both comparatively and considerably greater than those of non-tribal boys. All of these metrics are notably accelerated with increasing age in both categories. Although the discrepancies persisted throughout both the pre-pubertal and post-pubertal stages, the post-pubertal stage saw a greater degree of difference due to the tribal boys' substantially slower rate of growth in the MUAC, thigh, and calf circumferences after puberty.

Bone width (biepicondylar breadth of the humerus) measurements

This was observed that the average (mean ± SD) bi-epicondylar breadth of the humerus in pre-pubertal for tribal 5.40±0.54 and non-tribal 5.08±0.50 and in post-pubertal for tribal 6.3±0.29 and non-tribal 6.0±5.7. In tribal boys, the mean biepicondylar breadth increased continuously from 4.80cm ± 0.35 at age 10 years to 6.30cm ± 0.42 at age 16 years, with an average growth rate of 0.25 cm/year; in non-tribal boys, the mean biepicondylar breadth increased continuously from 4.65cm ± 0.17 at age 10 years to 6.10cm ± 0.36 at age 16 years with an average growth rate of 0.24 cm/year. When comparing tribal and non-tribal boys, the size of the difference was 5.9% at the prepubertal period, whereas it was only 2.4% during the post-pubertal stage. Due to the comparatively faster rate of growth in the biepicondylar breadth of the humerus in tribal males after puberty, it was discovered that the degree of disparity in these measurements was reduced at the post-pubertal stage.

Bone width (biepicondylar breadth of the femur) measurements

This was observed that the average (mean ± SD) bi-epicondylar breadth of the femur in pre-pubertal for tribal 7.50±0.93 and non-tribal 7.26±0.81 and in post-pubertal for tribal 8.80±0.67 and non-tribal 8.0±1.0. In tribal boys, the mean biepicondylar breadth of the femur increased with age from 6.50cm ± 0.27 at age 10 years to 8.75cm ± 0.51 at age 16 years (averaging growth of 0.37 cm/year), while in non-tribal boys, the average growth was 6.35cm ± 0.14 at age 10 years to 8.35cm ± 0.55 at age 16 years (averaging growth of 0.33 cm/year). The pubertal transition in tribal and non-tribal boys had an impact on the size of the difference; at the pre-pubertal and post-pubertal stages, the difference between tribal and non-tribal boys was 3.2% and 5.4%, respectively. Due to a relatively slower rate of growth in the biepicondylar breadth of the femur in tribal boys after puberty, which is in contrast to the findings in the biepicondylar breadth of the humerus in them, it was discovered that the degree of difference in these measurements was high at the post-pubertal stage.

This was observed that the average (mean ± SD) TST in pre-pubertal for tribal 25.2±2.1 and non-tribal 27.5±2.3 and in post-pubertal for tribal 28.2±2.3 and non-tribal 30.9±3.4. Measurements of skin folds are used to determine the thickness of subcutaneous tissues. Boys from tribal groups had much lower Total skinfold thickness (TST) and body fat percentages than boys from non-tribal groups. Total skinfold thickness (TST) significantly reduced after it continuously increased till the age of 13 years. This shrinkage of the fat folds is caused by the growth of the underlying muscle tissue rather than a reduction in the amount of fat buildup. Although the discrepancies persisted during both the pre-pubertal and post-pubertal stages, the post-pubertal stage saw a greater degree of difference due to the tribal boys' substantially slower rate of adiposity gain after puberty.

The mean Total skinfold thickness (TST) rose in non-tribal boys from 28.0mm ± 2.5 at age 10 years to 33.0mm ± 3.4 at age 16 years (Average growth in TST 0.83mm/year) and in tribal boys from 26.5mm ± 3.1 at age 10 years to 29.0mm ± 3.0 at age 16 years (Average growth in TST 0.41mm/year) and. In the pre-pubertal period, there was a 9.1% difference between tribal and non-tribal boys, and this difference persisted until the post-pubertal stage.

Body fat percentage measurements

This was observed that the average (mean ± SD) body fat in pre-pubertal for tribal 11.52±1.63 and non-tribal 13.25±1.72 and in post-pubertal for tribal 12.19±1.6 and non-tribal 14.28±2.2. To determine one's body composition, body fat is measured. An essential aspect of health that is connected to physical fitness is body composition. People with a healthy body composition typically live longer. It is well recognised that having too much body fat increases the chance of developing chronic conditions including high blood pressure, diabetes, hypertension, etc.

In tribal boys, the mean body fat increased from 11.20 % ± 1.58 at age 10 years to 13.20 % ± 1.32 at age 16 years with an average growth rate of 0.33 %/year, while in non-tribal boys, the mean body fat increased from 13.08 % ± 1.8 at age 10 years to 15.50 % ± 1.22 at age 16 years with an average growth rate of 0.40 % /year. In the current study, the largest average percentage of body fat was seen in boys aged 16 and older (13.20 and 15.50% in tribal and non-tribal boys, respectively). Body fat percentage then gradually drops, showing the creation of free fat mass at puberty, following a minor increase in relative fatness in late pre-pubertal age. Prepubertal stage differences between the two groups were measured at 15.0 percent, while post-pubertal stage differences were measured at 17.0 percent. Increased energy consumption and a bad lifestyle appear to be the cause of the rise in obesity in non-tribal boys. As a result, it may be inferred from the current study that tribal boys had less adiposity than non-tribal boys.

These findings were in line with the findings of prior research conducted by Ashtekar et al., (2020)[7], Saha et al., (2019)[8], Lakshmi et al., (2017)[9], Das et al., (2014)[10] they conducted a study on Anthropometric Status between Tribal and Non-Tribal and suggested that the Height, Weights, STS and Body fat values for tribal were highly significantly lower than non-tribal students and MUAC, chest, thigh, calf circumference, biepicondylar breadth of the humerus and biepicondylar breadth of the femur were significantly higher measured in tribal than non-tribal boys.

CONCLUSION

Between the pre-pubertal urban tribal and non-tribal boys and the post-pubertal urban tribal and non-tribal boys, there were substantial disparities in the anthropometric characteristics. First and foremost, a large-scale replication of the study is possible for improved results validation.

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