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A STUDY ON EVALUATION OF ANTHROPOLOGICAL MEASUREMENTS OF COLLEGE GOING STUDENTS OF ROHILKHAND REGION

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Abstract: The growth of students has been recognized as an important indicator to evaluate the health trends in the population and formulate strategies accordingly. The aim of the present study will be to determine the most commonly occurring weight abnormalities among college-going students of the Rohilkhand region and to compare them with the International Development References prepared by the World Health Organization (WHO) and the Centers for Disease Control and Prevention (CDC).

Keywords: WHO, CDC, Health, Abnormalities & Population

Introduction

The study of development student has to be viewed on a larger canvas as this continuous process comes into motion from the stage of embryonic development, to infancy, early childhood and extends itself to adolescence. Somatic development is important during childhood and adolescence as it lays the foundation for a person's future health status [1] and is linked to adult weight status and cardiovascular health [2]. Monitoring of children's growth is an important tool for defining standard reference values for the population, helping healthcare providers identify any abnormalities in growth patterns and devise preventive measures to avoid growth abnormalities. Anthropometry is a widely used, portable, inexpensive, simple and easy to implement technique, involving multiple body measurements. Anthropometry parameters such as height, weight, body mass index (BMI) are the best tools for the evaluation of nutritional status of children and

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adults [3]. This technique is not only economical and simple but has also been proven to be close to accuracy and universally accepted [4]; Being a non-invasive method of assessing growth in the human body. Reference values of anthropometric measures can be used to describe growth patterns, trends in body growth and development over time, disease risk, nutrition and general health status in children and adolescents [5] as a basis for monitoring long-term health values/indicators. Body mass index (BMI) [body weight (kg) / height (m) 2] also known as the Quetelet index [6] Although a crude index used to assess nutritional parameters to some extent, then Also it is a method of choice for clinical and research. Accurate measurement of height and weight serves as the basis for anthropometric characteristics for measuring excess and underweight in relation to body height. BMI is a very convenient, non-invasive screening tool for the assessment of weight status in children and adolescents to estimate underweight, overweight and obesity in the population [7]. Therefore, the determination of BMI cut-offs and BMI growth curves is useful for tracking weight trends in a population. Childhood overweight and obesity is a serious health problem and an independent risk factor for many cardiovascular and metabolic diseases [8]. Previously, obesity was considered a health issue of developed countries alone, but over the past two decades it has become a serious health concern in middle- and low-income countries [9]. Thinness and stunting are also important parameters to assess a child's physical and mental development. They are associated with higher morbidity and mortality, insufficient intellectual development, poorer academic achievement than children with normal growth parameters. Thinness and stunting reflect malnutrition, poor childcare, chronic infections and unsuitable environmental conditions. According to the WHO and the CDC, BMI-age values are recommended when considering underweight in children of school age and adolescents [10, 11].

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Methodology

The study has been conducted by the Department of Physiology and Cell Biology over 24 months starting from January, 2020. Rohilkhand (formerly Rampur State) is a region in the northwestern part of the state of Uttar Pradesh, India, centered on the Rampur, Bareilly and Moradabad divisions. Part of the Upper Ganges Plain, the region is named after the Rohilla tribe. Rohilkhand lies on the Upper Ganges Alluvial Plain and has an area of about 25,000 km2/10,000 sq mi (in and around Bareilly and Moradabad divisions). The Ganges Doab in the south and west, Uttarakhand in the north, Nepal in the east and Awadh region in the south-east mark its boundaries. Rohilkhand includes the cities of Amroha, Bahjoi, Bareilly, Bijnor, Badaun, Kakrala, Khutar, Moradabad, Najibabad, Pilibhit, Rampur and Shahjahanpur.

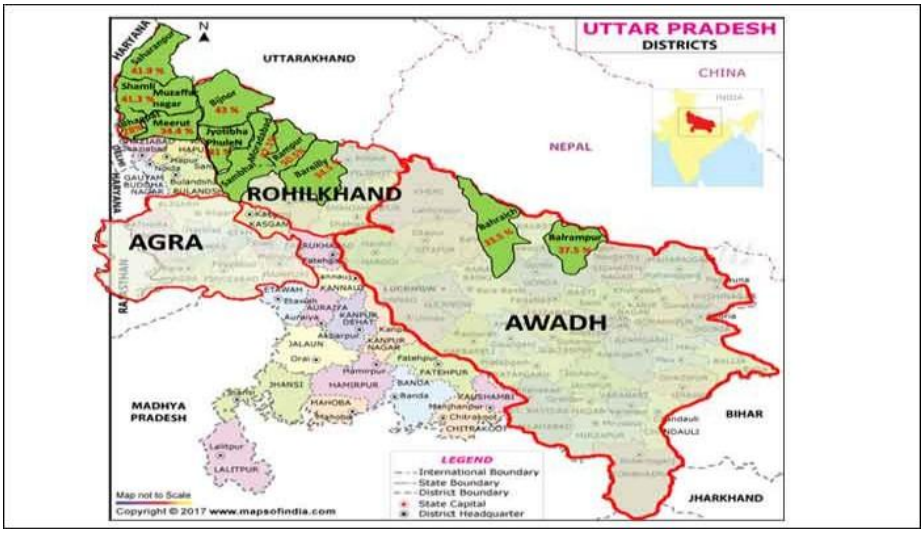

Figure 1.1: Study Area

Administratively it consists of the Rohilkhand region, 12 of which were randomly selected on the basis of their location, topography, climatic conditions and their rural, semi-urban and urban status. Study group of 10,050 college students aged 16-20 years. The college students were recruited from 35 different public and private sector schools located in rural, semi-urban and urban areas within the geographical boundaries of the

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province of Rohilkhand region. The age of the subjects was then calculated from the date of sampling in the exact day/month/year. The study population was divided into 12 monthly 9 groups. However, age was shortened to full years for analysis and documentation purposes as follows: for example, 16-years refers to participants aged 15.5–15.49-years. In addition, age accurate to two decimal places was used to generate percentiles for the various anthropometric measurements of the study subjects. A questionnaire was designed to ask participants relevant questions relating to demographic information and past medical or surgical history relevant to the study. We did not measure the effect of socio-economic status on the growth status of our study population. However, the study population includes similar representatives from different socio-economic classes, so we are confident that socio-economic status has a negligible effect on our aggregated results. Only a few studies have been conducted on representative populations from the Rohilkhand region, however, the data regarding anthropometric measurements is very inconsistent and rigorous studies covering a large population of college going students from different regions of Rohilkhand are needed. We initially conducted questionnaires on 50 college students from a local college to evaluate the questionnaires, to standardize the measurement protocol, to calibrate the instrument according to the prescribed schedule and method, to measure the data with accuracy and to follow the routine of the college. conducted a pilot study to reduce interference in Activities for evaluating a large number of students. The obtained pilot data clearly showed that the measurements obtained for height and weight were accurate with minimal error, making the measurement instruments suitable for data collection.

Anthropometric measurement

Anthropometric measurements were recorded for each individual by trained personnel following CDC recommendations by the National Health and Nutrition Examination

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Survey (NHANES) [21] in the Anthropometry Procedures Manual 2007. The assistants in data collection belonged to the medical field and were previously given extensive training to ensure the quality of the data. Anthropometric measurements included weight, height recordings made in all subjects.

The same instrument was used to obtain anthropometric data from all participating subjects for quality assurance. All measurements were made during college hours from eight in the morning to eleven in the morning with the permission of the principal/dean of the participating school.

Participants' weight in kilograms was measured using a digital scale (City Scale, Fzc, UAE) from light clothing without shoes to the nearest 0.2 kg. The weighing scale was calibrated with a set of 20 kg weights to ensure accuracy, following a standard protocol.

Standing height is a measure of maximum vertical size of the body and was measured with a portable stadiometer (SECA 217, SECA, USA), consisting of a vertical stand and an adjustable headpiece. Height was measured to the nearest 0.1 cm. The stadiometer was calibrated with a set of predefined lengths to ensure accuracy. When recording standing height, correct body posture was obtained.

Statistical analysis

All data entry and analysis were performed using SPSS version 15.0. Data were presented as the mean ± SD for 'n' where n represents the number of study participants. ANOVA test between the groups being compared.

Results

A total of 10,050 college students aged 16 to 20 years were assessed for this study with a mean age of 13.7 ±3.29-years (mean ±-SD). We calculated the body weight, height and calculated body mass index (BMI) of this sample, generated population growth centrifuge

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curves for these parameters and compared the obtained data with international standards. The obtained results are presented in detail in the following paragraphs.

Anthropometric measurement

Body weight

Data on the subjects' mean body weight (n = 10,050) showed a steady increase in the age groups included in the study until the age of 19 years. The first statistically significant increase in mean body weight compared to the previous age group was observed at 16 years of age. However, after 20 years no further growth was observed.

Supplementary Tables

Table 1: **Mean Body Weight ± SD of College-going-students of the Rohilkhand aged 16-20 years**

Body Weight (Kg)

Age (yrs)	**Mean**	**SD**
16	38.80$^{\#}$	7.44
17	42.28$^{\#}$	8.36
18	45.10$^{\#}$	3.77
19	46.66$^{\#}$	2.75
20	46.99	2.10

Values presented as mean ± SD (n=10,050) and were compared by ANOVA followed by Tukey's test. $P^{\#} < 0.05$ was considered significantly different from the previous age group.

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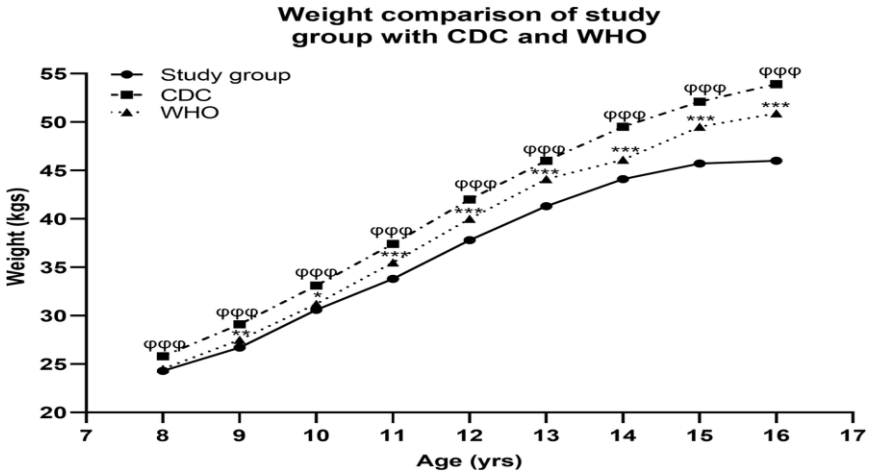
Table 2: Comparison of mean values of weight (Kg) of the study group with CDC and WHO standards.

Mean Body Weight (Kgs)

Age (yrs)	Study group	WHO	CDC
16	38.8	41.0***	43.0$^{\varphi\,\varphi\varphi}$
17	42.3	42.1***	47.0$^{\varphi\,\varphi\varphi}$
18	45.1	47.1***	50.5$^{\varphi\,\varphi\varphi}$
19	46.7	50.5***	53.1$^{\varphi\,\varphi\varphi}$
20	47.0	51.9***	54.9$^{\varphi\,\varphi\varphi}$

***** and$^{\varphi}$showed a significant difference between the mean BW of study groupand WHO, CDC references respectively according to Student's t-test.



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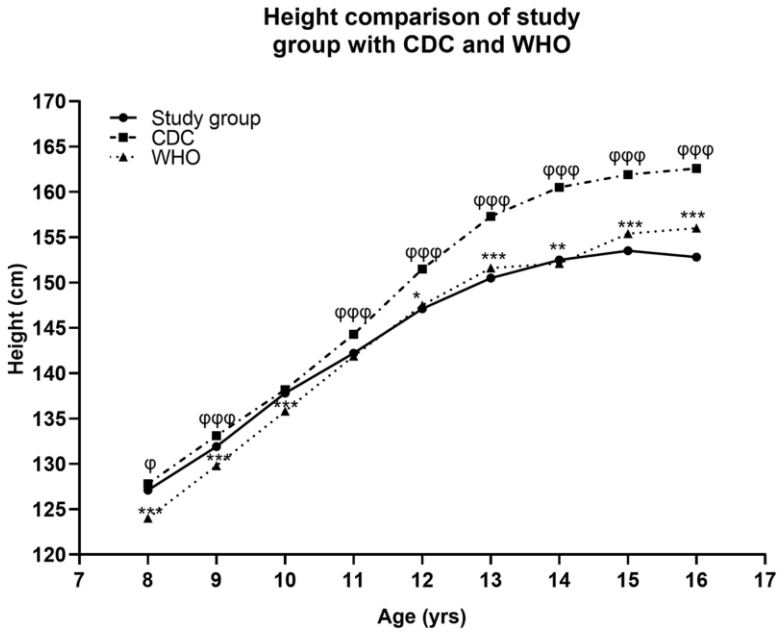
BW of the age-related study group (solid line) compared to values in the WHO (dotted line) and CDC (broken line) growth reference chart weight-by-age. * and showed a significant difference between study group mean BW and Student's t-test according to WHO, CDC references, respectively. Single, double and triple symbols displayed significance levels for $P < 0.05$, 0.01 and 0.001, respectively



Height of the age-related study group (solid line) compared to values in the WHO (dotted line) and CDC (broken line) growth reference charts weight-by-age. * and showed a significant difference between mean height of study group and WHO, CDC references according to Student's t-test, respectively. Single, double and triple symbols displayed significance levels for $P < 0.05$, 0.01 and 0.001, respectively

The average height of girls increased across the age groups under study and saw the first statistically significant increase of 4.78 cm at age 16 compared to the previous group. A similar trend was present in all subsequent ages, with a maximum increase of 5.92 cm

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observed at 17 years of age, continuing up to 19 years (Supplementary Table). However, no further increase in average height was observed after age 20.

Discussion

Weight, height and BMI increase with age in our Rohilkhand region, the population studied up to the age of 19 years; However, no further increases in body weight and height were observed at age 20. When the current data were compared with international standards, the mean body weight- and BMI-age of a college student from the Rohilkhand region was significantly lower than the WHO and CDC's growth references. In our study group, college students aged 16 to 17 years showed comparable values of height by age compared to CDC and higher values than WHO peers. However, girls between the ages of 18 and 20 had shorter heights than their CDC and WHO counterparts. The difference was more pronounced in the WHO references for all three weight, height and BMI anthropometric measurements compared to the CDC references. The study group's third, 50th and 97th percentiles of body weight, height and BMI were compared with CDC and WHO standards. The data showed that these percentages in our study group were lower than international standards, thus reflecting the inappropriateness of these standards to be used in our population for growth assessment.

Conclusion

In the present study we have generated centile curves comparing them with international standards (WHO and CDC) and the differences found are remarkable. The Rohilkhand region of college students age groups differed significantly from the WHO and CDC contexts, with comparatively less difference than the WHO rather than CDC development contexts.

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Limitations

First, the study was conducted only on college students and the data generated is for profiling the development of college students, although boys were not included in this study. Secondly, this study was conducted in Rohilkhand region. There may be differences in the development standards of college students from other provinces, which need to be considered in the future as well. Third, the data obtained was from a cross-sectional study and reflects the growth status of girls at one time point i.e. obesity or underweight is present in our population, although this data does not reflect trends in development, whether obese or underweight The side of the weight is a tilt/fall over time. Therefore, longitudinal studies are recommended to depict the growth trends in our population in the future on a larger canvas.

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