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Bhawna Panwar
Research Scholar, Department of Food and Nutrition, College of Community Science, Swami Keshwanand Rajasthan Agriculture University, Rajasthan, India

Dr. Sumitra Meena
Assistant Professor, Department of Food Science and Nutrition, College of Community and Applied Sciences, Maharana Pratap University of Agricultural and Technology, Udaipur, Rajasthan, India

Dr. Vishakha Singh
Associate Professor, Department of Food Science and Nutrition, College of Community and Applied Sciences, Maharana Pratap University of Agricultural and Technology, Udaipur, Rajasthan, India

Corresponding Author:
Bhawna Panwar
Research Scholar, Department of Food and Nutrition, College of Community Science, Swami Keshwanand Rajasthan Agriculture University, Rajasthan, India

Assessment of anthropometric measurement among tribal adolescent girls

Bhawna Panwar, Sumitra Meena and Vishakha Singh

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Abstract
The study "Assessment of Anthropometric Measurement among Tribal Adolescent Girls" was conducted in the operational villages of the All India Coordinated Research Project (AICRP) on Women in Agriculture (WIA) at Mharana Pratap University of Agriculture and Technology (MPUAT) in Udaipur, Rajasthan. A total of 150 tribal adolescent girls between the ages of 10-19 were studied (30 from each village). In terms of personal data, the findings revealed that around half (50%) of the study's participant population was between the ages of 13 to 15. Eighty-seven per cent of them belonged to the Gameti tribe, with 64% belonging to joint families. The annual family income of the majority of the population (81%), was determined to be less than one lakh rupees. Ninety-six per cent of the study population was vegetarian and around half (50%) of the household heads worked as labourers. According to data based on anthropometric measures, respondents' height was found to be slightly low and their weight was found to be very low when compared to the reference range provided by the Indian Council of Medical Research (ICMR) 2020. 90.66 per cent of the girls had BMIs that were within the low BMI (underweight) range, 54 per cent were severely thin and only 9.3 per cent had BMIs that fell within the normal range. Weight-for-Height (WHR) ratios were normal (45.3%) and increased compared to the reference range (54.6%) in respondents. Respondents had Weight-for-Height (WHR) ratios that were normal (45.3%) and in increased category compared to the reference range (54.6%). The results indicate that all of the three age groups received inadequate amounts of nutrients and that their intakes were below the dietary recommendations. Because respondents were primarily vegetarians and did not consume enough fruits, vegetables, milk, or dairy products in their daily diets.

Keywords: Adolescent, anthropometric, height

Introduction

A nutritious diet is crucial to human life and is recognised as a major factor in retaining good health while also contributing to societal well-being. Nutrition is the ingestion of food that meets the body's nutritional needs. A well-balanced diet is essential to optimum health. The World Health Organisation defines adolescence as being between the ages of 10 and 19. Human health is significantly impacted by nutrition. Adolescence is a nutritionally susceptible age group due to the body's rapid physical development; this period of physical development is one of transition because it signals the start of puberty (Thakur and Gautam, 2017) [14].

This vital stage is intimately related to reproductive health and requires special attention to be treated effectively. The health and nutrition of today's adolescent females may have a significant impact on the quality of future generations. To address the issue of undernutrition among indigenous people, appropriate nutritional programs and health policies must be implemented (Bharthi *et al*. 2017) [2].

India is home to more than half of the world's indigenous population, commonly known as tribals. "Adivasi," which means "original residents" in Hindi, refers to 8.1% of India's total population (Faizi and Nair, 2016) [3]. The Indian government designated 72 tribal communities as primitive tribes because of their poor rate of growth, lack of access to modern technologies, and extremely low literacy rates (Bairwa, 2016) [1].

Adolescents are more likely to be underweight or stunted. The cumulative consequences of poor nutrition, particularly in the first two years of life, cause stunting in adolescents (Nithya and Bhavani, 2018) [8].

Undernutrition is more widespread in younger age groups (especially 15-19), in rural regions, and among scheduled tribes for women (NFHS - 5). It is commonly known that a variety of nutrient-dense meals must be consumed in order to achieve nutritional requirements, yet indigenous people have limited awareness of nutrition. According to the NFHS-5 study, 40% of girls aged 15-19 years and 24.8% of scheduled tribe females aged 15 to 49 years had a BMI less than 18.5.

The research is further justified by its examination of socio-economic and dietary factors contributing to poor nutritional status. The majority of the participants belonged to low-income households with limited access to diverse and nutrient-rich foods. Additionally, their predominantly vegetarian diet, coupled with inadequate consumption of essential food groups like fruits, vegetables, milk, and dairy, exacerbates their nutritional deficiencies. These findings emphasize the urgent need for targeted interventions, including nutritional awareness programs, dietary diversification, and government-led initiatives to improve food security and health outcomes in tribal communities.

Objective: To assess of anthropometric measurement among tribal adolescent girls.

Materials and Methods

The present research study entitled "Assessment of Anthropometric Measurement of Tribal Adolescent Girls" was carried out in Udaipur district of Rajasthan. The present study, titled "Anthropometric Measurement of Tribal Adolescent Girls," was conducted in Udaipur district of Rajasthan. The study was carried out in operational villages of The Nutri Smart Village Programme (All India Coordinated Research Project) on WIA (Women in Agriculture) in Udaipur district, Rajasthan. Five schools were selected from the list of schools in the villages of *Bramino ki Hunder*, *Ferniyon ka Guda*, *Loyra*, *Madar* and *Thoor*. 150 tribal adolescent girls aged 10 to 19 years were chosen. A total of 150 tribal adolescent girls (30 from each school) were selected at random, with 30 girls choosing from each school. The survey form contained general background data as well as anthropometric measurements. The researcher took anthropometric measures. Anthropometric measurements were taken using a portable height scale and a portable weight balance, respectively. Background information was prepared to obtain general information/personal particulars about the selected sample, including their name, age, family type, respondents' addresses, mobile numbers, economic background, caste, family income, educational qualification/class, and food habits.

Anthropometry plays a crucial part in population nutrition surveys and assessing the severity of undernutrition in individuals and groups. Growth retardation could be the body's first response to nutritional deficiencies. Anthropometric measurements, which examine a person's height (or stature) and weight, are important indications of their nutritional status and overall health (Shrilakshmi, 2018) [13]. These measurements indicate if a baby, child, adolescent, or adult is developing appropriately for their age.

The BMI was calculated by dividing the absolute weight (kg) by the square of height. It eliminates dependence on frame size by defining adiposity in terms of weight and height, accounting for changes in body composition (Jellifee, 1966) [6]. After determining body mass index, patients were classified according to WHO (2004) [15]. The waist circumference measures the area around the abdomen. Waist circumference is a straightforward and simple way to estimate intra-abdominal fat mass and overall body fat. Height and the waist-to-hip circumference ratio have no bearing on waist circumference (WHO, 2000) [16]. The data was examined using frequency, percentage, mean, standard deviation, and the f-test.

Results and Discussion

General analysis of the information revealed that around half (50%) of the research population was between the ages of 13 and 15 years. 87 per cent belonged to the Gameti tribe, and 64 per cent were from joint families. The majority of the population (81%), had an annual household income of less than one lakh. 96 per cent of the study's population was vegetarian, and around half (50%) of the household members worked as labourers.

Height: Both genetic (hereditary) and environmental factors influence a person's height. the mean height of tribal adolescent girls aged 10 to 12 years was 136.50±6.46, girls aged 13 to 15 years was 145.97±5.91 cm, and girls aged 16 to 18 years was 151.76±4.86 cm. The average height of girls aged 10-12, 13-15, and 16-18 was statistically comparable to the height suggested by the ICMR (2020) [5] for these three age groups.

Weight: Weight is the most common and reproducible anthropometric measure used to determine a person's nutritional status. The mean weight of girls aged 10 to 12 years was 26.63±3.94 kg, the mean weight of responders aged 13 to 15 years was 34.19±4.73 kg, and the mean weight of girls aged 16 to 18 years was 39.63±3.96 kg. The weight of girls of all ages was statistically lower than the optimal weight for girls as stated by the ICMR (2020) [5]. According to Gagebo *et al*. (2020) [4] respondents' median weight was 42 kg. Stunting (low height for age) and thinness (low body mass index for age) were prevalent among all adolescent girls at 29.6 per cent and 19.5 per cent, respectively. Stunting and thinness were more common in older/late adolescent girls than in younger/early teenage girls (35.6% vs. 25.7% and 21.8% vs. 17.9%, respectively).

BMI: According to Table 1, 90.66 per cent of respondents were underweight, whereas 9.3 per cent were within the normal range. Girls in villages had lower BMIs for a variety of reasons, primarily connected to poverty. According to Santhanam and Maheswari, 2022 [12], the mean BMI (Body Mass Index) of the study participants was 15.89±1.89 kg/m^2. The average BMI was 18.8 kg/m2. The majority of respondents (41%), had BMIs characterised as low weight normal, while 31% had CED-grade I mild, 17% had CED-grade II, and 2% had CED-grade III severe.

Table 1: BMI classification of respondents

Category		Total respondents (N=150)	
Category	BMI (kg/m2)	Frequency	%
Underweight	< 18.50	136	90.66
Severe thinness	<16.00	81	54
Moderate thinness	16.00 - 16.99	25	16.66
Mild thinness	17.00 - 18.49	30	20
Normal range	18.50 - 24.99	14	9.3
Over weight	≥25.00	0	0
Obese	≥30.00	0	0
Total		150	100

Source: WHO BMI Classification (WHO 2004)

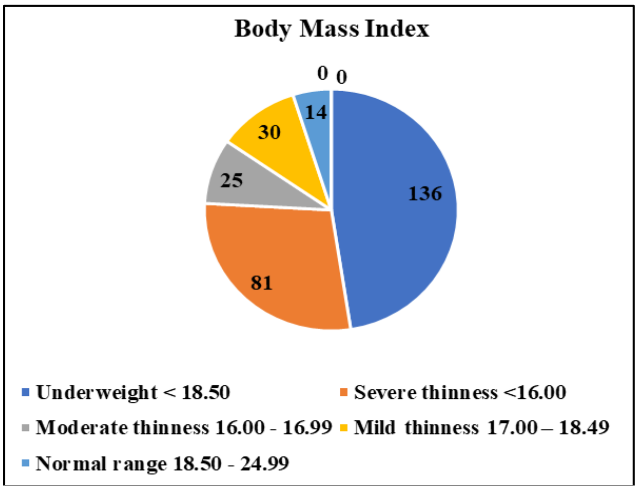

Fig 1: Percent and frequency distribution of respondents according to BMI

Waist and hip circumference: The waist circumference is used to classify central obesity. The hip circumference is measured at the maximum buttock circumference, although some studies assess the waist circumference at the narrowest waist point (Ross *et al.*, 2008) [10]. The NHLBI (National Heart, Lung, and Blood Institute) Obesity Education Initiative (2000) advises an upper maximum of 80 cm for girls' waist circumference, with 88 cm being the cut-off point value. Girls had mean waist and hip circumferences of 59.98cm+5.95 cm and 74.77+7.90 cm, respectively.

Waist to hip ratio: The waist to hip ratio is widely acknowledged as a method for measuring body fat. It demonstrates that the abdominal area is the most common location for fat storage. According to Table 2, 54.7 per cent of respondents fell into the 0.80 cm or greater category, while 45.3 per cent fell into the 0.80 cm or normal category. WHR had an average value of 0.79±0.05. Girls showed higher abdominal obesity. The findings are consistent with those of Rani and Rani (2016) [11], who studied abdominal obesity and overweight in 200 school-aged adolescents (13-17 years) in Fatehabad, Haryana, and discovered that 25.5% of them were at risk of abdominal obesity, with girls having a significantly higher prevalence of abdominal obesity and overweight than boys.

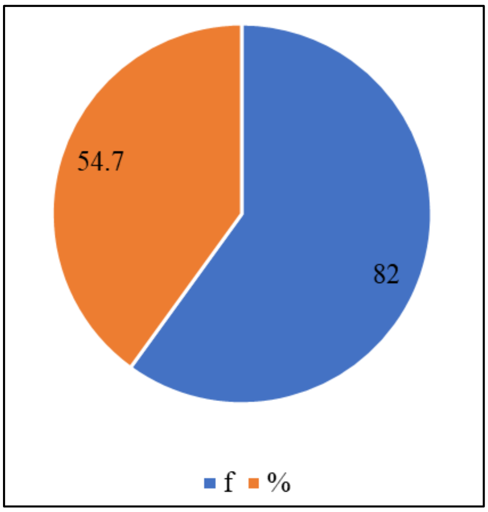

Fig 2: Percent and frequency distribution of respondents according to WHR classification

Table 2: WHR classification of the respondents

WHR	Frequency	%	Mean± SD
<0.80 cm (normal)	68	45.3	0.79±0.05
≥0.80 cm (Increased)	82	54.7	
Total	150	100.0	

Conclusion

The study "Assessment of Anthropometric Measurement among Tribal Adolescent Girls" highlights significant concerns regarding the nutritional and health status of tribal adolescent girls in Udaipur, Rajasthan. The findings reveal that a majority of the participants exhibited lower-than-average height and significantly low weight compared to ICMR (2020) [5] reference standards, with 90.66% classified as underweight and 54% as severely thin. The high prevalence of malnutrition, particularly among adolescent girls from low-income households, underscores the impact of socio-economic factors on nutritional outcomes.

The study further emphasizes that limited dietary diversity, largely due to a predominantly vegetarian diet and inadequate consumption of essential nutrients from fruits, vegetables, milk, and dairy products, contributes to widespread undernutrition. The weight-for-height ratio indicated a higher proportion of respondents falling into the increased category, signaling potential risks of stunting and thinness. Additionally, waist-to-hip ratios suggested a significant prevalence of abdominal obesity despite overall underweight conditions.

These findings highlight the urgent need for targeted nutritional interventions, awareness programs, and policy measures to improve the dietary intake and overall health of tribal adolescent girls. Implementing community-based nutritional programs, ensuring access to diverse and nutrient-rich foods, and strengthening health education initiatives can play a crucial role in addressing malnutrition in this vulnerable population.

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