



TO ASSESS THE NUTRITIONAL STATUS OF ADOLESCENTS: AN ANTHROPOMETRIC STUDY IN ALIGARH CITY UTTAR PRADESH INDIA

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ABSTRACT India has the largest population of adolescence in the world being home of 243 million individual aged 10-19 years. Malnutrition denotes impairment of health arising either from deficiency or excess or imbalance of nutrients in the body. The present study was a cross-sectional study covering 400 adolescents (boys and girls) between 11-16 years of age from 4 schools of Aligarh City through stratified random sampling. Students were interviewed and anthropometric measurements were taken. The data obtained were tested through WHO reference 2007 Anthro Plus 1.0.4 to calculate HAZ and BAZ. The overall prevalence of stunting was found to be 10.3% out of which 11% were boys and 9.5% were girls, overall thinness among adolescents found to be 9% from which 12% were boys and 6% were girls and prevalence of overweight and obesity among adolescents were found to be 11.8% and 1% respectively. Adolescent is vulnerable age group with high prevalence of malnutrition, therefore should be given priority in national health programs.

KEYWORDS : Adolescents, Anthropometric, Malnutrition, Nutrition Status, Thinness, Stunting.

INTRODUCTION

Adolescence is a period in one's life where physical and mental maturation takes place allowing one to gradually move from being a child to an adult as described by Spear et al¹

India has the largest population of adolescence in the world being home of 243 million individual aged 10-19 years². Percentage of adolescents 12-17 years of age who are in excellent or very good health were 81.6%. Percentage of adolescents 12-19 years of age who are obese were 20.6%³. Malnutrition denotes impairment of health arising either from deficiency or excess or imbalance of nutrients in the body⁴. India has one of the highest underweight burdens in the world, even twice that of sub-Sahara region. However, India is now also beginning to experience the emerging problem of overweight^{5,6}. Good nutritional status in adolescents and adults is decided by proper nutritional knowledge, eating habits, and food behaviour, which plays an important role not only in the improvement of physical development but also in the maintenance of mental and emotional stabilization.⁷

The prevalence of under nutrition is a major public health concern in many of the developing countries in Asia due to its immense population size, socio-economic disparities, illiteracy and inadequate access to health facilities. As a result, assessments of nutritional status have the potential to play significant roles in formulating developmental strategies in India⁸.

Assessment of nutritional status by anthropometry is the simplest and most useful tool for assessing the nutritional status of children. As suggested by Gibson⁹, Examples of anthropometric indices are weight for age, height for age, weight for height and BMI for age etc.

OBJECTIVE-

To study the nutritional status of adolescent boys and girls through anthropometric measurements.

METHODOLOGY-

Adolescents in the age group of 11 to 16 years (boys and girls) from class VI to X standards were selected through stratified random sampling by dividing the city of Aligarh into 4 specific zones on geographical layout. The sample size was drawn on the basis of prevalence of under nutrition i.e. stunting and under weight (Low height for age and low BMI for age) of Lucknow City i.e. 36.4%, as Lucknow is the capital of Uttar Pradesh¹⁰. By using $4Pq/d^2$ formula final sample size comes 400.

Anthropometric Measurements- For the purpose of present study, body weight and height of the adolescents (11-16 years) were measured for the assessment of their nutritional status.

For the purpose of present study, height for age z-score (HAZ) and BMI for age z-score (BAZ) of the adolescents were calculated. BMI-for-age is the recommended indicator for assessing thinness,

overweight and obesity in children 10-19 years is recommended by the WHO¹¹.

Height for Age:

Low height for age i.e. stunting for the purpose of present study, adolescents (11-16 years) with z-score of $<-2SD$ for height for age were classified as stunted and those who were $<-3SD$ were termed as severely stunted. Children with z-score between $-2SD$ to $+2SD$ were considered as normal as per the WHO criteria and classification standard.

BMI for age:

Body Mass Index (BMI) is an index of weight-for-height that is commonly used to classify underweight, overweight and obesity.

For children 5-19 years

- The +1 SD which is the cut-off for overweight.
- The +2 SD considered the cut-off for obesity.
- The +3 SD cut-off severely obese.

For thinness and severe thinness the cut-offs are -2 and -3 SD, respectively.

Statistical analysis

For the purpose of present study, the researcher used World Health Organizations' WHO Reference 2007 (5-19 years) Anthro Plus version 1.0.4 statistical software by using nutritional survey to calculate the HAZ and BAZ of the adolescents.

RESULTS-

Table 1.1: Composition of the Population Sample

Composition	Frequency(n)	Percentage (%)
Total population	400	100
Gender		
Boys	200	50
Girls	200	50
Age (years)		
11	50	12.5
12	82	20.5
13	82	20.5
14	50	12.5
15	97	24.3
16	39	9.8

Table 1.1 showed the total numbers of children studied were 400 (200 boys and 200 girls) in the age group of 11 to 16 years. The gender representation of the children was 50 per cent for both male and female adolescents. The age representations of adolescents were 12.5 percent for the age of 11 years, 20.5 percent for the age of 12 and 13 years, 12.5 percent for the age of 14 years, 24.3 percent for the age of 15 years and 9.8 percent for the age of 16 years respectively.

Table 1.2: Mean values of Height and Weight of adolescents on the basis of age

Age in year	No. of adolescents (n)	Height (cm) Mean + SD	Weight (kg) Mean + SD
11	50	145 + 8.1	37.6 + 8.7
12	82	149 + 9.7	39.8 + 9.6
13	82	151.8 + 7.7	42.2 + 8.6
14	50	157.7 + 8.3	47.0 + 8.6
15	97	161.2 + 9.1	49.9 + 9.7
16	39	160.9 + 10.1	53.7 + 11.3
Total	400	154.32 + 10.6	44.7 + 10.7

The mean weight of the study population ranged from 37.6 kgs (8.7 SD) to 53.7 kgs (11.3 SD). The increment in mean weight from 11 to 16 years in this study was 44.7 (10.7 SD) kgs and mean height of the study population ranged from 145 cm (8.1 SD) to 160.9 cm (10.1 SD) the increment in mean height from 11-16 years in this study was 154.32 (10.6 SD).

Nutritional Status through Anthropometric measurements (HAZ and BAZ) of Adolescents Using WHO-Z Score System

WHO, z score system was used to classify the nutritional status of adolescents on the basis of height for age z score and BMI for age z score (HAZ and BAZ).

Height for Age (HAZ)

Adolescents (11-16) were categorized as normal and stunted according to height for age z score (HAZ). It was surprising to mention that no case of severely stunted was found in the present study.

Table 1.3: Classification of Adolescents According to Height for Age (WHO, 2007 Standards)

	NORMAL -2SD to +2SD		STUNTED <-2SD	
	n	(%)	n	(%)
Boys	178	89	22	11
Girls	181	90.5	19	9.5
Total	359	89.8	41	10.3

Regarding the classification of height for age (WHO, 2007 standards) it was clear from the table 1.3 that, out of 400 adolescents, 359(89.8 percent) were normal, from which 178 (89 percent) were boys and 181(90.5 percent) were girls where as only 41 (10.3 percent) adolescents were stunted out of which 22 (11 percent) were boys and only 19 (9.5 percent) were girls, prevalence of stunted (low height for age) was higher in boys as compared girls.

BMI for Age (BAZ)

Table 1.4: Classification of Adolescents According to BMI for Age (BAZ)

(WHO, 2007 Standards)

	Thin <-2SD		Normal -2SD to + 1SD		Overweight >1SD		Obese > 2SD	
	n	(%)	n	(%)	n	(%)	n	(%)
Boys	24	12	152	76	23	11.5	1	0.5
Girls	12	6	161	80.5	24	12	3	1.5
Total	36	9	313	78.3	47	11.8	4	1.0

The above table 1.4 showed the classification of BMI for age (WHO, 2007 standards) that, out of 400 adolescents, 313 (78.3 percent) were normal, 47 (11.8 percent) were overweight, 4(1.0 percent) were obese and about 36 (9 percent) were thin the prevalence of thinness was higher in boys 24 (12 percent) whereas the prevalence of overweight and obese were higher in girls 24 (12 percent) and 3 (1.5 percent) as compared to boys 23 (11.5 percent) and 1 (0.5percent).

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DISCUSSION-

In India, youths (from 10 to 19 years) represented 22.8%of the and they deal with a series of serious nutritional problems that are influencing their growth and development as well as their livelihood as adults¹²

The mean weights /age were higher in the present study as compared to Majumdar et al¹³. The mean height of the present study was similar to Majumdar et al study. The prevalence of stunting was higher in Kishore¹⁴ study in India among adolescents, as compared to the present study. Another study carried out by Atif et al¹⁵ on adolescent boys in Aligarh city and found the general prevalence of stunting among boys was similar to the present study. In a study held in Noida, Uttar Pradesh on adolescent students, Shrivastav et al¹⁶ showed that overall 12.5% children were stunting these results were similar to the present study. The reason for similar results may be because of similar geographical area of Aligarh and Noida.

Unzagaa et al¹⁷ study found the higher prevalence of overweight and obesity 24.9% and 23.7% in Mexico City as compared to the present study and prevalence of thinness 1.6% was lower as compared to present study. In contrast, certain previous studies reported the prevalence of thinness higher than the present study Singh and Devi¹⁸ in Manipur found 28% of thinness among adolescents.

CONCLUSION-

India has one of the quickest growing adolescence populations in the World. If adolescent are well nourished, they can make ideal utilization of their skills, abilities, and energies today and be solid and mindful natives and parents of healthy children tomorrow. To achieve such a task and in order to break the intergenerational cycle of malnutrition, a unique concentration for defeating adolescence malnutrition is required. It is therefore an appropriate time for health promotion programmes based on documented relationships between behavior in this age group, obesity and other disease risk factors.

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