

AGE-SEX TRENDS OF UNDER NUTRITION AMONG THE ADOLESCENT SCHOOL CHILDREN IN AN URBAN RESETTLEMENT COLONY OF DISTRICT GAUTAM-BUDHNAGAR, UTTAR PRADESH: A COMPARATIVE STUDY WITH WHO 2007 REFERENCE STANDARDS

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ABSTRACT

Background: The World health organization (WHO) defines adolescents as individuals between the ages of 10–19 years and they make up about 20% of the world's population. Under-nutrition is still highly prevalent among the adolescents of developing countries including India.

Aims & Objective: The present study was undertaken to assess the age-sex trends of under nutrition among the adolescent age group school children of 11-18 years age group in District Gautambudh-nagar, Uttar Pradesh.

Material and Methods: A Cross-sectional study was carried out in the Government schools in Bhangel, the urban field practice area of Department of Community Medicine. A questionnaire was administered to 392 school students (290 boys and 102 girls) of 11-18 years age group studying in Vith-XIIth standard. All the students were also subjected to measurement of height and weight. Body mass index (BMI) of all students was calculated. The heights and BMI of the students were then compared with the WHO 2007 reference standards.

Results: The mean BMI was found to be less as compared to the WHO 2007 reference standards in both the sexes and the difference was found to be statistically significant in almost all age groups. The mean height was found to be less as compared to WHO reference for height in all age groups in both sexes and the difference was statistically significant in almost all age groups.

Conclusion: The present study indicates that the nutritional status of the adolescent school children in our country is very poor.

KEY-WORDS: Adolescents; Undernutrition; Body Mass Index (BMI); WHO 2007 Reference Standards

Introduction

Adolescence refers to the developmental period between childhood and adulthood. The World health organization (WHO) defines adolescents as individuals between the ages of 10–19 years and they make up about 20% of the world's population.^[1] Adolescence is the second most critical period of physical growth after the first year. Twenty five percent of adult height and up to fifty percent of adult weight are attained during adolescence.

Malnutrition (under nutrition or over nutrition) which refers to an impairment of health either from a deficiency or excess or imbalance of nutrients is of public health significance among adolescents all over the world. It creates lasting effect on the growth, development and physical fitness of a person. Despite the economic growth

observed in developing countries, malnutrition and particularly under nutrition is still highly prevalent.^[1] Under nutrition (stunting and wasting) in adolescents has detrimental effects, as it affects their ability to learn and work at maximal productivity. Concurrently, a growing prevalence of obesity and its related chronic diseases is being observed in these countries.^[2] In developing countries, this rising epidemic along with the persistence of under nutrition and infections typifies the 'Double Burden of Malnutrition' (DBM).^[3]

According to World Health Organization, the ultimate intention of nutritional assessment is to improve human health. It is well recognized worldwide that anthropometric measurements are indispensable in diagnosing under nutrition. The present study was undertaken to assess the age-sex trends of under nutrition among the

adolescent age group school children of 11-18 years age group in District Gautambudh-nagar, Uttar Pradesh.

Materials and Methods

Study Type: The study was cross-sectional (Observational) in nature

Study Area: The study was carried out in the Government schools in Bhangel, the urban field practice area of Department of Community Medicine.

Study Duration: The study was carried out between July to September 2012.

Sample Size: By taking the prevalence of malnutrition ranging from 6-50% in school going adolescent children in various studies and taking prevalence of malnutrition as 50% and relative precision of 10% at 95% confidence interval, optimal sample size comes out to be 400.

$$\begin{aligned} \text{Sample Size} &= 4 pq/d^2 \\ &= (4 \times 50 \times 50)/ 25 \\ &= 400 \end{aligned}$$

Methodology: Since there are two government schools in Bhangel, the study sample was selected from both the schools. A total of 1200 students from both the schools were enrolled as primary unit and every third student was selected as study unit by systematic random sampling. Out of the 400 students selected, 8 students refused to participate in the study. After taking prior permission from the principals of schools, dates of visits to the schools were fixed. A semi structured, pre-tested questionnaire was administered to each of the 392 students (290 boys and 102 girls) of 11-18 years age group studying in Vith-XIIth standard. The questionnaire included socio-demographic data (Age, Sex, father's and mother education, occupation and family income). All the students were subjected to measurement of height and weight and BMI was calculated.

Height: Height in centimetres was marked on a wall with the help of a measuring tape. All students were made to stand against the wall without foot wear and with heels together and

their heads positioned so that the line of vision was perpendicular to the body. A glass scale was brought down to the topmost point on the head and the height was recorded.

Weight: A bathroom scale was used for recording weight. The zero error was checked for and removed if present. The clothes of the students were not removed as adequate privacy was not available.

Body Mass Index (BMI): BMI of all the students was calculated by using the formula:

$$BMI = \frac{\text{Height (kg)}}{\text{Height (m)}^2}$$

Statistics: The data thus collected was entered on Excel master chart and then statistically analyzed. The BMI and height of the children were compared with the WHO 2007 reference standards for adolescents and older children⁴. Weight for age has been found to be unreliable and therefore has not been included in this analysis.

Results

Of the total study subjects, 290 (73.9%) were boys and 102 (26.0%) were girls (Table 1). Among all the age groups from 11-18 years of age, the mean BMI was found to be less as compared to the WHO 2007 reference standards in both the sexes and the difference was found to be statistically significant, however the difference was not found to be significant in girls of 16 and 17 years age groups (Table -2). The difference in mean height was found to be less as compared to WHO reference for height in all age groups in both sexes and the difference was statistically significant however the difference was not significant for 11 years age group boys (Table 3).

Table-1: Distribution of Study Subjects according to Age & Gender

Age (years)	Boys (%)	Girls (%)	Total (%)
11	10 (2.6)	5 (1.3)	15 (3.82)
12	22 (5.6)	18 (4.6)	40 (10.2)
13	32 (8.2)	15 (3.8)	47 (11.9)
14	63 (16.1)	19 (4.8)	82 (20.9)
15	53 (13.5)	13 (3.3)	66 (16.8)
16	64 (16.3)	13 (3.3)	77 (19.6)
17	22 (5.6)	12 (3.1)	34 (8.7)
18	24 (6.1)	07 (1.8)	31 (7.9)
Total	290 (73.9)	102 (26.0)	392 (100)

Table-2: Distribution of Study Subjects according to Mean BMI at Various Ages & Gender*

Age Group	Boys				Girls			
	Observed Mean BMI & SD	WHO Standard Mean	Mean Difference	P - Value	Observed Mean BMI & SD	WHO Standard Mean	Mean Difference	P - Value
11	15.3 (1.45)	16.9	1.6	(0.01)S	14.8 (1.20)	17.2	2.4	(0.01)S
12	15.9 (2.13)	17.5	1.6	(0.01) S	14.9 (1.52)	18.0	3.1	(0.01)S
13	16.4 (2.52)	18.2	1.8	(0.01)S	16.3 (2.43)	18.8	2.5	(0.01)S
14	16.4 (2.16)	19.0	2.6	(0.01)S	17.2 (1.69)	19.6	2.4	(0.01)S
15	16.8 (2.28)	19.8	3.0	(0.01) S	17.8 (2.5)	20.2	2.4	(0.02)S
16	17.7 (1.87)	20.5	2.8	(0.01)S	18.8 (3.85)	20.7	1.9	(0.1) NS
17	17.5 (1.71)	21.1	3.6	(0.01)S	18.5 (4.28)	21.0	2.5	(0.5) NS
18	18.8 (2.76)	21.7	2.9	(0.01)S	19.5 (1.62)	21.3	1.8	(0.02)S

* Significance test: z - test; S: Significant; NS: Non-significant; Reference mean: WHO 2007 standard mean for adolescent age group; SD: Standard Deviation

Table-3: Distribution of Study Subjects according to Mean Height at Various Ages & Gender*

Age Group	Boys				Girls			
	Observed Mean Height & SD	WHO Standard Mean	Mean Difference	P - Value	Observed Mean Height & SD	WHO Standard Mean	Mean Difference	P - Value
11	142.5 (12.9)	143.1	0.6	(0.1)NS	139.2 (4.32)	145	5.8	(0.01)S
12	145.36 (8.36)	149.1	3.74	(0.01)S	145.33 (7.0)	151.2	5.9	(0.01)S
13	153.37 (7.36)	156.0	2.63	(0.02)S	146.26 (7.81)	156.4	10.14	(0.01)S
14	156.6 (7.4)	163.2	6.6	(0.01)S	151.31 (6.74)	159.8	8.49	(0.01)S
15	163.49 (7.38)	169.0	5.51	(0.01)S	150.92 (8.11)	161.7	10.78	(0.01)S
16	164.0 (7.1)	172.9	8.9	(0.01)S	152.46 (7.56)	162.5	10.04	(0.01)S
17	163.78 (5.20)	175.2	11.42	(0.01)S	154.62 (5.98)	162.9	8.28	(0.01)S
18	164.18 (7.13)	176.1	11.92	(0.01)S	157.07 (7.04)	163.1	6.03	(0.02)S

* Significance test: z - test; S: Significant; NS: Non-significant; Reference mean: WHO 2007 standard mean for adolescent age group; SD: Standard Deviation

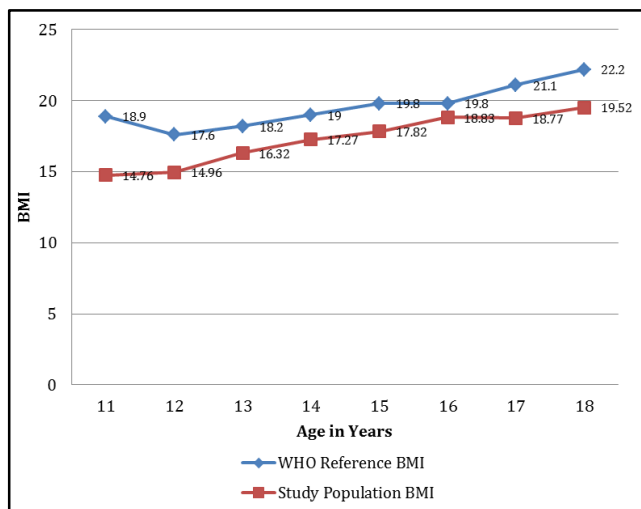


Figure-1: Comparison of Study Population Adolescent Girls BMI with WHO Reference BMI (Z-Score)

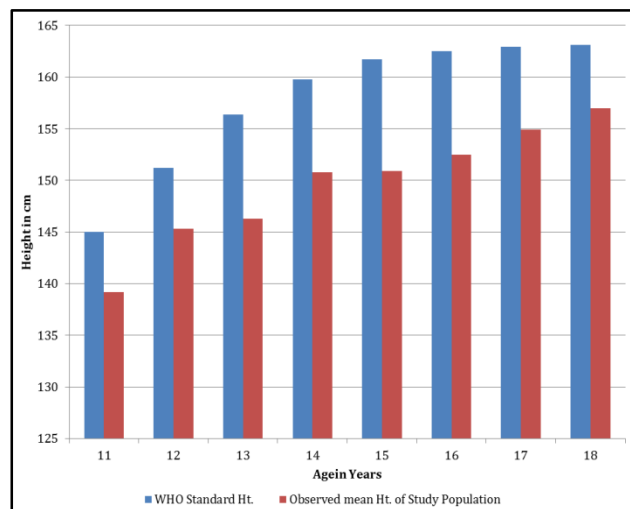


Figure-3: Comparison of Study Population Adolescent Girls Mean height with WHO 2007 Reference Standards

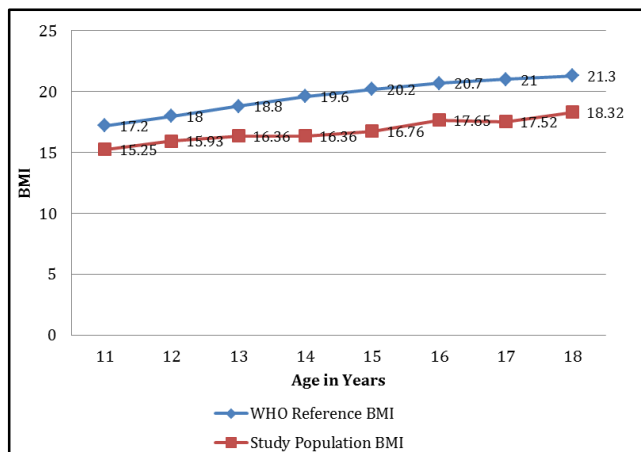


Figure-2: Comparison of Study Population Adolescent Boys BMI with WHO Reference BMI (Z-Score)

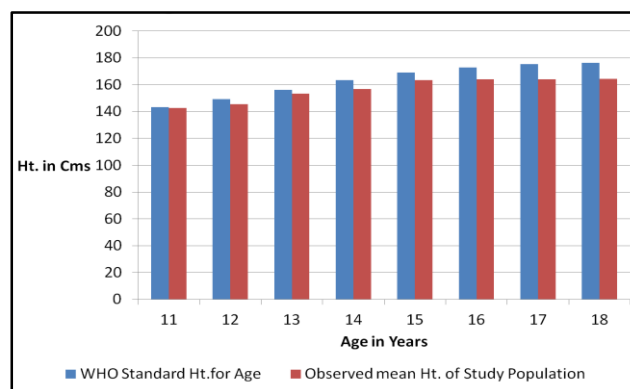


Figure-4: Comparison of Study Population Adolescent Boys Mean height with WHO 2007 Reference Standards

Discussion

In the present study, the mean BMI and height for adolescent boys and girls were found to be significantly lower than WHO reference standards in almost all age groups. This high prevalence of malnutrition observed among govt. school students of Bhangel area may be due to the inadequate dietary intake of food. This may be related to the low socio-economic background of these children. Similar findings of mean BMI lower than the reference standards was also observed in a study conducted by Thekdi^[5] among school students of 11-15 years age group in Surendra-nagar district, Gujarat. Another study conducted by Hasan^[6] among government school students of 8-14 years age group of Azad Nagar, Bangalore also showed mean BMI to be lower than WHO reference standards in all age groups. However, these findings are different from those observed by Gharib^[7] in Bahrain where the median BMI among school students 6-18 years of age was comparable to WHO standards in boys and higher than WHO standards in girls. This may be attributed to the higher standards of living of people in Bahrain. In relation to height, the findings of this study are in contrast to that observed by Sachan^[8] among adolescent girls of 10-19 years of age in Lucknow. This study by Sachan showed that the mean height of adolescent girls of all age groups in both urban and rural schools was better than ICMR standards except in age 19 years in urban schools.

Conclusion

The present study indicates that the nutritional status of the adolescent school children in our country is very poor, particularly among children residing in resettlement colonies. As a preventive

strategy, there is need to include nutrition and health education under school health services.

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