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Research Article

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Nutritional status of adolescent boys in urban and rural Aligarh, Uttar Pradesh, India

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ABSTRACT

Background: Adolescent is the period between 10 and 19 years. They form the future generation of a country. Adolescents' nutritional needs are critical for the well being of a society. Poor nutritional status during adolescence is an important determinant of health outcome. The adolescents have different needs and have diverse problems. This study was conducted to assess the nutritional status and find out the morbidity pattern of the school going adolescents. **Methods:** A cross-sectional study was done covering 500 students between 10-19 years of age from rural and urban schools of district Aligarh. Students were interviewed and anthropometric measurements were taken. The data obtained were tested statistically by percentages and Chi-square Test using SPSS 17.

Results: The overall prevalence of stunting was found to be 12.29 % in rural and 8.59 % in urban areas. Overall 4.51 % students were found to be suffering from severe stunting in rural areas in comparison to 0.39 % in urban areas. **Conclusions:** Adolescent is vulnerable age group with high prevalence of malnutrition, therefore should be given priority in national health programs.

Keywords: Anthropometry, Adolescents, Stunting, Nutritional status

INTRODUCTION

The term adolescence meaning "to emerge" or "achieve identity" is a relatively new concept, especially in developmental thinking. The origin of the term is from Latin word; 'adolescere' meaning, "to grow, to mature". However, a universally accepted definition of the concept has not been established.¹ The world is home to 1.2 billion individuals aged 10–19 years forming 18% of world population. Adolescents number have been doubled since 1950.² Adolescence may be divided into three developmental stages based on physical, psychological and social changes; early adolescence- 10 to 13 years, middle adolescence- 14 to 16 years, late adolescence- 17 to 19 years.³

Adolescence is the future generation of any country. Their nutritional needs are critical for the wellbeing of a society⁴ but for many years, their health has been neglected because they are considered to be less vulnerable to diseases compared to relatively young children or the old people.⁵ Nutrition is an important aspect of adolescence as it is a rapidly growing period of life. Adolescents are in the process of establishing responsibility for their own health-related behaviours, including diet. Large scale surveys reveal sharp regional and rural/urban inequalities in health outcomes, with the rural population bearing the burden of mortality, morbidity, and under nutrition disproportionately.

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METHODS

The study was done in registered schools of the Department of Community Medicine, JNMC, AMU, Aligarh. The total population of male adolescents in all the schools was 2533, out of which a sample of 512 students (256 from the rural schools and 256 from the urban schools) were selected using Probability Proportionate to Size sampling (P.P.S.). Only 500 students cooperated in the study. The sample size was calculated using the formula –

Sample = $\{(1.96)2 \text{ PQ}\} / \text{L2}$.

where prevalence (P) = 20%, Q = (1-P), Precision (L) = 9%.

The age of the student was recorded on their last birthday (Gregorian calendar) from the school record. A detailed clinical and dietary history and a thorough physical examination were conducted for each adolescent and clinical impression was made at the end of the examination. Weight (kgs) and Height (cms) was taken according to standard protocol.

Period of study

The present study was carried out for a period of one year from 1st of August 2013 to 31st July 2014.

Type of study

This was a cross- sectional study.

Inclusion criteria

Male students between 10 to 19 years were taken it the study.

Exclusion criteria

Students below 10 & above 19 years, Non co-operative, chronic absentee and girl students.

Study tools

Pretested pre-framed proforma, measuring tape, weighing machine.

Ethical consideration

Before the starting of the study-

- Approval was taken from Institutional Ethical Committee.
- Permission was taken from school authority in each and every school. Principal of the schools was the main authority in all schools.
- Informed consent taken from students, who were more than 18 years.

 Health education & adequate counseling were provided to all the students of concerned class.

Statistical analysis

The data obtained were tested statistically by percentages and Chi-square test. Moderate stunting is a consequence of chronic malnutrition. It is defined as Z score between -2 to -3 SD and that of severe stunting is defined as Z score less than -3 SD. (WHO growth reference for adolescents, 2007)

Thinness between -2 SD to -3 SD in WHO Z-Score.

Severe Thinness < -3SD in WHO Z-Score.

RESULTS

Table 1: Distribution of the study population according to age and place of residence.

Age (yrs)	Place				Total		
	Urban		Rural		Total		
(y15)	No.	(%)	No.	(%)	No.	(%)	
10	6	2.34	9	3.69	15	3.00	
11	7	2.73	38	15.57	45	9.00	
12	16	6.25	45	18.44	61	12.20	
13	18	7.03	35	14.34	53	10.60	
14	62	24.22	25	10.25	87	17.40	
15	41	16.02	27	11.07	68	13.60	
16	40	15.63	17	6.96	57	11.40	
17	43	16.80	30	12.30	73	14.60	
18	16	6.25	16	6.56	32	6.40	
19	7	2.73	2	0.82	9	1.80	
Total	256	100	244	100	500	100	

Table 2: Distribution of mean weight (kg) in the study population.

Urban	Rural		
Mean Wt (Kg)	Mean Wt (Kg)		
28.00	24.67		
27.00	27.16		
31.08	32.89		
36.31	30.55		
49.18	37.14		
49.21	41.22		
52.74	48.82		
48.00	52.18		
51.50	57.50		
56.42	47.00		
	Mean Wt (Kg) 28.00 27.00 31.08 36.31 49.18 49.21 52.74 48.00 51.50		

Table 1 shows that overall 17.40% of all students were 14 years old. Maximum students (24.22%) in urban schools were 14 yrs old and those of rural (18.44%) were 12 years old. It can also be seen from table 1 that overall least population was seen in extreme ends of adolescence

(10 and 19 years). Only 1.80% of study population was 19 years old and those of 3.0% were 10 years old. Dropout rate can be one the reasons for lesser study population of 19 years of age.

Table 3: Distribution of weight according to age (mean and 50th percentile) in the study population.

Age	Mean	50 th perc	entile weigh	t (median)
(yrs)	Wt (Kg)	Urban	Rural	NCHS
10	26.00	28.00	24.00	31.4
11	27.13	26.00	27.00	35.3
12	32.26	30.00	32.00	39.8
13	32.40	37.00	30.00	45.0
14	45.55	47.00	36.00	50.8
15	46.01	45.00	40.00	56.7
16	51.54	51.00	47.00	62.1
17	51.38	48.00	51.00	66.3
18	53.21	51.00	61.00	68.9
19	54.33	55.00	47.00	-

The distribution of mean and median is shown in table 2 and table 3

The mean weight of the study population ranged from 26 kgs to 54.33 kgs. The increment in mean weight from 10 to 19 years in this study was 28.33 kgs and from 12-18 years, it was 20.95 kgs. In urban schools, mean weight ranges from 28 kgs to 51.50 kgs and those of rural, it ranged from 24.67 kgs to 47 kgs.

50th percentile weight (median) of 10-19 years age group was also different in urban and rural population. In urban, median weight ranged from 28 kgs to 55 kgs from 10 to 19 years and those of rural students, it was from 24 kgs to 47 kgs. Median weight was less than NCHS values⁶ of median age for each group from 10 to 19 years.

The peak weight velocity of 13.15 kgs per year was between 13 to 14 years in our study probably because of growth spurt at this age group.⁷

Table 4: Distribution of stunting and severe stunting in the study population according to place of residence.

Place	Height for age							
	Normal		Moderate stunting (-2 to -3 SD)		Severe Stunting (<-3SD)		Total	
	No.	%	No.	%	No.	%	No.	%
Urban	233	91.02	22	8.59	1	0.39	256	51.2
Rural	203	83.20	30	12.29	11	4.51	244	48.8
Total	436	87.20	52	10.40	12	2.40	500	100.0

Table 4 shows a significant correlation with urban and rural areas with height for age. Moderate and severe stunting were more in rural than urban area and were 12.29% and 4.51% respectively and this relation was statistically significant. (Chi square-11.347, degree of freedom-2, p=0.003). Overall stunting in study population found to be 10.4% and those of severe stunting was 2.4%.

DISCUSSION

At all states level the dropout rate at the primary stage was 2.7% in 2008-09 and it increased to 3.1% in 2009-10 in India. At the upper primary stage the dropout rate have remained almost same at 2.1% and 2.2% for the two years. At the primary stage there is a similar dropout rate for boys and girls but at the upper primary stage there is a higher percentage of boys dropping out as compared to the girls.⁸

In a study done in Aligarh by Ahmad et al⁹ showed that in rural area, majority of the population (59%) belonged to 10-13 years age group as compared to (26.5%) of urban area of same age group which is comparable to our study.

The mean weights /age were higher in the present study as compared to Majumdar et al¹⁰ where the mean weights of boys (12-18 years) ranged from 33.5 kgs to 43.5 kgs. The difference in the range of mean weight and total increment in the mean weight in Majumdar et al¹⁰ study and present study may be because of different sampling techniques were used in the present study and study carried out by Majumdar et al¹⁰ and later study was done in rural areas only. The peak weight velocity of the boys was 6 kgs per year in Majumdar et al¹⁰ was also between 13 to 14 year that is similar to our study.

The increment in mean weight from 10 to 19 years in this study was 28.33 kgs and from 12-18 years (20.95 kgs) as compared to Majumdar et al¹⁰ where the total increment in mean weight from 12-18 years was 14.8 kgs.

Goldstein⁷ also reported that that the weight spurt starts at the age of 13 years. It is probably because of sudden hormonal changes in body of an adolescent.

In a study held in Noida, Uttar Pradesh on adolescent students, Shrvastav et al¹¹ showed that overall 12.5% children were found to be suffering from stunting and 1.5% from severe 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. Mushtaq et al¹² did a study on 5-12 years children in Pakistan and depicted 8% children were stunted which is similar to the present study. They also depicted that prevalence of stunting significantly increased with age. Bose & Bisai¹³ observed a decreasing trend of under nutrition from 53.54% to 41.54% among boys and from 45.76 to 20.17 per cent among girls from 10 years to 15 years of age. Vashist et al¹⁴ found that stunting in urban areas ranged from 6.5 to 15.2% among males and the overall nutritional status among the rural subjects was poor than the urban subjects for both the sexes which supports my study findings.. In another study, Venkaiah et al¹⁵ showed 39% of the adolescents were stunted (<Median 72 SD of NCHS height for age) irrespective of sex which was higher than the present study. Medhi et al¹⁶ studied adolescents in Assam and found that prevalence of stunting in boys were as high as 47.4% which is an alarming sign. Singh et al¹⁷ found that prevalence of chronic malnutrition (stunting) in male was 26.31% in adolescents of Bareilly Uttar Pradesh.

CONCLUSION

Adolescence, a second period of rapid growth may serve as an opportunity for compensating faltered early childhood growth though the potential for significant catch-up is limited. If the adolescents are well-nourished, they can make optimal use of their skills, talents and energies and would be healthy and responsible citizens. It is therefore an appropriate time for health promotion programmes based on documented relationships between behaviour in this age group, obesity and other disease risk factors. Adolescents can and should take responsibility for their nutrition and the long-term repercussions on health. In addition to it, adolescents of rural areas are more malnourished than urban areas so there must be an equal emphasis on both.

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Institutional Ethics Committee

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