



IMPACT OF NUTRITIONAL STATUS ON ACADEMIC PERFORMANCE AMONG SCHOOL-GOING ADOLESCENTS OF RURAL MEERUT

Community Medicine

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ABSTRACT

Balanced nutritional intake is required for adequate biological functioning, and any deficit or excess could lead to alterations in the cognitive processes related to the learning of reading and writing. Undernourished children have been shown to have decreased attendance, attention, and academic performance as well as experience more health problems compared to well-nourished children. This study investigated the nutritional status and its effect on the academic performance of students in a government school of rural Meerut. Methodology: A Cross sectional study conducted in a Government Inter College in the rural area of Meerut. Sample size taken was 197 adolescents (10-19 years), by taking prevalence of malnutrition as 32.8%. Students were selected from each class and were interviewed using predesigned pretested questionnaire supplemented with anthropometric examination and BMI estimation.

Results: Out of total 197 students who participated, 57.9% adolescents were under weight and 65.5% of the students were academically weak. 89.5% of the underweight students had got poor scholastic performance as compared to 24.7% of normal weight adolescents ($P < 0.001$). 61.7% of the males and 53.4% of the females were found to be underweight. Conclusion: The nutrition have significant impact on the academic performance of students. In spite of all the nutritional programs running in government schools, there is a need to supervise their implementation properly and strictly in all the school.

KEYWORDS

Malnutrition, Underweight, Body Mass Index.

INTRODUCTION

Children and adolescents are considered to be the most important natural resources and biggest human investment for development in every community. The health and nutritional status of children and adolescents is an index of national investment in the development of its future manpower.¹ Adolescents contribute to approximately 21% of Indian population yet very little focus is there on their health. According to CNNS 2016-2018 report, the percentage of underweight, overweight and obese adolescents (10-19 years) in India are- 24.1%, 4.8% and 1.1% respectively and in Uttar Pradesh are -22.4%, 2.3%, and 0.5% respectively.²

Nutrition is concerned primarily with body growth, development and maintenance. Nutritional status is an important index for measuring quality of life especially in children. Malnutrition, which refers to deficiencies, excesses, or imbalances in a person's intake of energy and/or nutrients, is one of the largest public health issue in a developing countries like India.³ Nutritional deficiency in childhood can make a child more prone for infectious diseases like pneumonia and tuberculosis. Chronic malnutrition experienced during early life inhibits growth, retards mental development; reduce motivation and energy level, causing a reduction of educational attainments.⁴ During the adolescent growth spurt, body requires a lot of nutrients which should be stored in the body during childhood and if the body stores are deficient, it can result in adverse health consequences like growth retardation, scholastic backwardness and reduced work capacity.⁵ School age is a dynamic period of physical growth as well as mental development of the child. So, schools are the best place to start training the children about the importance of good nutrition because the uncluttered minds will more readily grasp the suggestions related to health and diet.

OBJECTIVES:

The present study was undertaken to fulfill following objectives-

- 1) To assess the nutritional status of adolescents (10-19 years) in a government school of rural Meerut and
- 2) To assess the association of malnutrition with Academic performance of students.

MATERIAL AND METHODS

A Cross-Sectional survey was conducted among school going students in a Government school with classes up to intermediate in the rural field practice area (Machhra) of department of Community Medicine, LLRM Medical college and Hospital, Meerut. This study was conducted from September to November 2019. The sample size was calculated by taking prevalence of malnutrition as 32.8%⁶ and 20% relative precision at 95% confidence interval, using formula:- $n = (1.96)^2 p q / e^2$.

Sample size obtained was 196.6 which was rounded off to 197. Thus, 197 adolescents in the age group of 10-19 years, studying in classes 6th-12th were included in the study. 28 children were selected in each class by Simple random sampling using lottery method and interviewed using predesigned pretested questionnaire. Anthropometric measurements were taken for the assessment of nutritional status.

Study design: Cross sectional study

Study location: A Government Inter College, Machhra, district-Meerut, Uttar Pradesh, India

Study duration: September 2019 to November 2019

Sample size: 197 students

Sample size calculation:- by taking Prevalence of malnutrition as 32.8%⁶ and 20% relative precision at 95% confidence interval, the sample size was calculated as 196.6, which is rounded off to 197.

Subjects & selection method:

The study population was drawn from 6th-12th class, 28 students was chosen from each class randomly.

INCLUSION CRITERIA:-

1. The children in the age group of 10-19 years,
2. Who were present on the day of study,
3. Who gave informed consent.

EXCLUSION CRITERIA:-

1. The children who are less than 10 and more than 19 years,
2. Who were absent on the day of study,
3. Who did not give informed consent.

Procedure Methodology:

Informed consent was taken by all the included students. Complete information was received with the help of students which was followed by their detailed examination. The information was obtained from students on a pre-designed and pretested questionnaire. Height and weight of students was obtained by using measuring tape and electronic weighing scale according to the standard procedures. The values for height, weight and BMI was transformed to Z-scores by using WHO-growth percentile chart for adolescents.⁷ BMI was calculated as Weight(in kgs)/Height (in m²). The study was approved by the institutional ethical committee.

The health indicators used on the basis of Z-score were:

- Underweight/Thinness:-** Children with BMI for age Z-score below 2 SD from the median of the reference population were considered underweight for their age.
- Overweight:-** Children with BMI-for-Age Z-score above 1 SD from the median were considered overweight for their age.
- Obesity:-** Children with BMI-for-Age Z-score of 2 SD or above from the median of the reference population were considered obese for their age.⁷

Assessment of Academic Performance:

The academic performance was assessed by obtaining compiled report card from the class teacher. The overall percentage was divided into Good (percentage >70%, CBSE grade A1, A2 and B1) and Poor (percentage ≤70%, CBSE grade <B2).⁴

Statistical analysis:

The collected data was compiled and analyzed using EPI info software version 7.0 and Percentages, p- values and Fisher's exact tests were calculated.

The Level $P < 0.05$ was considered as the cutoff or significant value.

RESULTS

Study was done on all children of age 10 to 19 years present in the selected school. A total of 197 students, who were present on the day of examination and gave the complete information were included in the study. Among the total 197 students, 53.8%(107) were males and 46.2%(90) were females.

Of the total 197 students, 129(65.5%) had poor academic performance (Score ≤70%) and rest of the students 68(34.5%) had score >70% . (Table No.1)

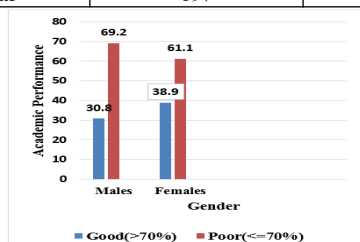
Table No 1: Distribution of Academic Performance

Academic Performance	FREQUENCY (N=197)	PERCENTAGE (%)
GOOD(>70%)	68	34.5
POOR(≤70%)	129	65.5
TOTAL	197	100.0

Among all 197 students, 57.9%(114) were found to be underweight with Z-score <-2SD, Overweight (Z-score >+1SD) was present in 4%(8) of the study subjects and BMI-for-age with Z-score of 2 SD and above (obese) was found in among only 1 % (2) of the study population. (Table 2)

Table No 2: Prevalence of Malnutrition

BMI-for-AGE	FREQUENCY (N=197)	PERCENTAGE (%)
Under weight(<-2SD)	114	57.9
Normal	73	37.1
Over weight(>+1SD)	8	4.0
Obesity(≥+2SD)	2	1.0
Total	197	100.0

**Figure No 1: Gender Distribution of Academic Performance**

Of the total 107 males, 69.2% (74) performed poorly academically while 30.8% (33) showed good performance. On the other hand, out of total 90 females, 61.1% (55) had poor academic performance. Thus, males were more academically weak than females in the study population. (Figure 1)

Table 3 shows the association of malnutrition with the academic performance of students in the study population. It showed that of the total 114 underweight children, 102 children (89.5%) had poor academic performance (Score ≤70%), while among 73 normal weight children, 18 children (24.7%) had poor academic performance, the difference was found to be statistically significant with $p < 0.05$ and Fisher's Exact test value < 0.001 .

Table no 4 shows gender distribution of malnutrition among male and female students from the selected government school studied. The result revealed a higher prevalence of undernutrition among the male (61.7%) compared to the female (53.4%) students. More of the female students (43.3%) had normal nutritional status compared to the male (31.8%). This showed that the nutritional needs of the females were taken good care of and given more attention than the male students

Table no 3: Association Of Malnutrition with Academic Performance

Academic Perf.	GOOD N (%)	POOR N (%)	TOTAL N (%)	P-value <0.001 Fisher's Exact <0.001
Malnutrition				
Underweight (<-2SD)	12 (10.5)	102 (89.5)	114 (100.0)	
Normal	55 (75.3)	18 (24.7)	73 (100.0)	
Overweight (>+1SD)	0 (0.0)	8 (100.0)	8 (100.0)	
Obese (≥+2 SD)	1 (50.0)	1 (50.0)	2 (100.0)	

Table 4: Gender distribution of Malnutrition

	Under weight N (%)	Normal N (%)	Over weight N (%)	Obese N (%)	Total N (%)
Male	66 (61.7)	34 (31.8)	5 (4.6)	2 (1.9)	107 (100.0)
Female	48 (53.4)	39 (43.3)	3 (3.3)	0 (0.0)	90 (100.0)

DISCUSSION

The present cross-sectional study was done to find the prevalence of malnutrition and to assess the relationship between nutritional status and academic performance in a government school of rural area of Meerut, Uttar Pradesh. Study revealed a high prevalence of malnutrition among students attending this school and a significant relationship between nutritional status and academic performance of students. The findings show that undernutrition affected more than half of the students; that boys were more commonly affected than girls; boys were more academically weak than girls and underweight students showed more poorer performance than normal weight students.

In the present study, 57.9% students were found to be underweight, using WHO BMI-for-Age growth percentile charts for Adolescents. These results are comparable to the Bhoite et al (2011)⁹ which reported prevalence as 70%. While study by Sohini et al (2011)¹⁰, Essien et al (2012)¹¹ and Yubraj et al (2019)¹² reported lower prevalence of underweight as 33.3%, 22.9% and 24.9% respectively among school going adolescents.

The prevalence of underweight in the study was found to be more among boys (61.7%) than girls (53.4%) which is comparable to Medhi et al (2007)¹³ which reported that 59.5% of boys and 41.3% of girls were underweight. While study by Sohini et al (2011)¹⁰ reported less prevalence of underweight among boys (37.8%) and in girls as 27.5%.

In the study, malnutrition was associated with poor academic performance which was found to be statistically significant ($p < 0.001$) which is comparable to the findings by Essien et al (2012). Thus, Malnutrition impairs the ability to concentrate, learn, and attend school regularly. A child who is malnourished cannot adequately take advantage of instructional and learning materials taught in school. All

of these consequences of malnutrition compromise children's attendance and performance at school.

Limitation Of The Study-

i) In the present study, only one government school in rural area was covered because no other government schools had classes up to 12th (Inter). Different results might be present in urban schools.

CONCLUSION AND RECOMMENDATIONS

The study confirms a high prevalence of under-nutrition (57.9%) among adolescents in rural school going children of Machhra, Meerut in line with national prevalence. The study also revealed a significant association of undernutrition with academic performance of these students. The present study raises an urgent need to address this problem in school going children by instituting routine annual monitoring of nutritional status, strengthening and strict implementation of government run nutritional programs in schools, provision of nutritional counselling for underweight adolescents and further research on causes and impact of undernutrition and evaluation of the various nutritional programs for school going adolescents both girls and boys. All the schools should organize a Fit India School Week in month of November/December every year to ensure and to inculcate the behavioral changes that is from sedentary life style to physically active way of day-to-day living. As Schools are the first formal institution after home where physical fitness can be taught and practiced, the institution can organize periodic seminars, role play and in-person interviews on the effects and consequences of ill health/malnutrition and how to make their health better in terms of healthy diet, physical activity, screen time, etc. Schools can also organize biannually parents'-teacher meeting to raise the child's health concerns among parents. Furthermore, to motivate the students to maintain their health, the school authority should develop a scoring which will include both health factors and academic performance of students and on the basis of this, best student should be recognized and felicitated in front of all the students every year. That is what this study recommends-making students allrounder and marking 'Student of the year'.

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