

Relationship between nutritional status and academic performance in school children

NEHA BANSAL

Guest Faculty

Department of Home Science, University of Allahabad, Allahabad (U.P.) India

ABSTRACT

The academic performance of children impacts their future educational attainment and health and has therefore emerged as a public health concern. The present study was conducted to examine the relationship between nutritional status and academic performance of children. A cross sectional study was carried out in two co educational schools of Allahabad city- Tagore Public School and YMCA Centenary School and College. A total of 679 school children from 6th to 8th standards aged between 11 to 13 years were studied. Weight and height of children were measured and Body Index Mass (BMI) was calculated. Indian standards for BMI for age and gender were used as reference. Children with Body Mass Index above 95 percentile were considered as obese; those between 85 and 95 percentile as overweight and those below the 05 percentile were considered as underweight. To evaluate the academic performance of children their CGPA (average grade point obtained in all the subjects) was recorded from the school register. Chi square test was used for statistical analysis. In the study overall prevalence of overweight, obesity and underweight was found 19.3%, 8.0% and 4.5%, respectively among school children. The occurrence of overweight and obesity was higher among boys (20.8% and 10.5%) than girls (17.1% and 4.3%) whereas underweight was found higher among girls (5.7%) compared to boys (3.5%). In terms of academic achievement by gender, larger number of girls (17.5%) obtained excellent grade compared to boys (6.5%) whereas 23.8% boys secured poorer grade than girls (18.6%) and the difference was found highly significant ($p=0.0000$). With respect to nutritional status, it was observed that higher proportion of obese (31.5%) followed by underweight (30.0%) and overweight children (22.9%) secured poor grade than normal weight children (19.6%). Nutritional status was found significantly ($p=0.01$) related with the academic performance of children. Hence children should be encouraged to adopt healthy dietary practices and lifestyle in order to maintain healthy normal body weight as this will help them to perform better in school.

Key Words : Nutritional status, Body Mass Index, Academic achievement

INTRODUCTION

The nutritional status of a population determines the overall health status which affects the growth and development of a society (World Bank Group, 1997). There are various

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indices based on anthropometry *i.e.* weight for age (underweight), height for age (stunting), weight for height (wasting) and BMI for age (thinness) used to assess nutritional status of school children. BMI is the most appropriate variable for nutritional status (Krishnaswamy *et al.*, 2010). Nutritional status is defined as the assessment of the state of the nourishment of a patient or a subject (Mosby, 2008). Insufficient daily consumption of foods has been found to affect health status, and poor health and nutritional status may hinder a child's ability to learn (Ivanovic, *et al.*, 1992). The academic performance of children impacts their future educational attainment and health and has therefore emerged as a public health concern (Kramer *et al.*, 1995). In addition, good academic achievement is directly related to good scoring in various entrance examination and job opportunities therefore always a matter of concern for both parents and students (Kim *et al.*, 2003).

There is converging interest among public health scientists and school policy makers in the health status of adolescents and its impact on their academic achievement (Inga *et al.*, 2007). So, it becomes important to understand the relation between nutritional status and academic performance of children. To our knowledge, relevant study has not been done in Allahabad. Therefore, the present study was undertaken with the following objectives:

1. To assess the nutritional status of school children.
2. To study the relationship between nutritional status and academic performance of school children.

METHODOLOGY

Study subjects:

The children belonging to 11-13 years age and studying between 6th to 8th standard from two co educational private schools (Tagore Public School and Y.M.C.A. Centenary School and College) of Allahabad city were selected for the study.

Procedure:

The anthropometric measurements were taken and Body Mass Index (BMI) was calculated. Standard charts for BMI for age and gender were used as reference standards. Children with body mass index above 95th percentile were considered as obese, those between 85th to 95th percentile as overweight and those below 5th percentile were considered as underweight (Agarwal *et al.*, 2001). To assess the academic achievement of children their average grade points scored in all the subjects (CGPA) was recorded from the school register. Grade were categorized as 9.1-10 = Excellent, 8.1-9 = Very Good, 7.1-8 = Good, 6.1-7 = Average and <6 = Poor.

Statistical Analysis:

The collected data was presented in percentages and analyzed by chi square test. $p < 0.05$ was considered significant.

RESULTS AND DISCUSSION

Total number of 679 children in the aged between 11 to 13 years from 6th to 8th standard

were studied. Out of them (58.8%) 399 were boys and (41.2%) 280 were girls.

Table 1 shows that overall prevalence of normal weight, overweight, obesity and underweight was 68.3%, 19.3%, 7.9%, 4.5%, respectively among school children. Results reveal that out of 679, 31.7% children were malnourished and 68.3% were well nourished. Additionally, it also reveals that higher proportion of malnourished children were above normal weight (27.2%) whereas only (4.5%) underweight. Findings of the present study are supported by Park *et al.* (2009) and Wang *et al.* (2009) who reported a clear transition of children from being underweight to becoming overweight and obese. Similarly, Gupta *et al.* (2011) reported that prevalence of obesity has increased significantly from 9.8% in 2006 to 11.7% in 2009 ($p < 0.01$) whereas underweight decreased from 11.3% to 3.9% ($p < 0.001$) among urban Asian Indian adolescents in New Delhi (North India).

Table1: Nutritional status of children according to BMI for age percentiles (n=679)			
Nutritional status	Boys (n=399)	Girls (n=280)	Total (n=679)
Normal weight	260 (65.2%)	204 (72.9%)	464 (68.3%)
Overweight	83 (20.8%)	48 (17.1)	131 (19.3%)
Obesity	42 (10.5%)	12 (4.3%)	54 (7.9%)
Underweight	14 (3.5%)	16 (5.7%)	30 (4.5%)
	399 (58.8%)	280 (41.2%)	

The proportion of overweight and obesity was found higher among boys (20.8% and 10.5%) as compared to girls (17.1% and 4.3%) whereas the proportion of underweight was higher among girls (5.7%) than boys (3.5%). Results are consistent with the study conducted by Goyal *et al.* (2010) and Gupta *et al.* (2011). On the contrary, Kumar *et al.* (2007) reported higher prevalence of obesity in girls than boys.

Table 2 shows the distribution of different grades achieved by boys and girls in the school examinations. Out of total 679 students, 25.7% scored 'good' as well as 'average' results followed by 'poor' grade (21.6%); 16.2% obtained 'very good' while 11.0% of them scored 'excellent' results. In terms of academic achievement by gender it was found that higher proportion of girls (17.5%) obtained excellent grade compared to boys (6.5%) on the other hand higher proportion of boys (23.8%) secured poorer grade than girls (18.6%). The difference existed between the academic performance of boys and girls was found highly significant ($p = 0.0000$) statistically. Similar observations were reported by Srinivas and Venkatkrishnan (2016) that girls have better academic performance compared to boys.

Table 3 shows that that higher proportion of obese children (31.5%) obtained poor

Table 2 : Academic achievement of children by gender			
Grades	Boys (399)	Girls(280)	Total(679)
Excellent	26 (6.5)	49 (17.5)	75 (11.0%)
Very good	65 (16.3)	45 (16.1)	110 (16.2%)
Good	108 (27.1)	65 (23.2)	173 (25.5%)
Average	105 (26.3)	69 (24.6)	174 (25.7%)
Poor	95 (23.8)	52 (18.6)	147 (21.6%)

$$X^2=21.19; p=0.000*$$

grade followed by underweight (30.0%) and overweight (22.9%) than normal weight children (19.6%). In the present study nutritional status was found significantly ($p=0.01$) related with the academic performance of school children. Study done by Naik *et al.* (2015) also reported a highly significant relationship and positive association between nutritional status and academic achievement among 9-11 years age government school children. Similarly, another study conducted by Rashmi *et al.* (2016) on 582 students from class 1-7 in rural Bangalore concluded that the nutritional status of the children is strongly associated with their academic performance. Essien *et al.* (2012) also observed that malnutrition was negatively and significantly related with the academic performance. Acham (2010) showed that although a number of factors play a significant role in determining a child's educational outcomes, child's health and nutritional status are some of the potential factors that can influence educational achievement. Hence children should be encouraged to adopt healthy life style and dietary practices in order to maintain healthy weight status as this will help them to perform better in school.

Table 3 : Relationship between nutritional status and academic achievement of school children					
Nutritional status	Excellent (%)	Very good (%)	Good (%)	Average (%)	Poor (%)
Normal weight (464)	58 (12.5)	72 (15.5)	119 (25.6)	124 (26.7)	91 (19.6)
Overweight (131)	08 (6.1)	31 (23.7)	25 (19.1)	37 (28.2)	30 (22.9)
Obesity(54)	07 (12.9)	04 (7.4)	17 (31.5)	09 (16.7)	17 (31.5)
Underweight (30)	02 (6.7)	03 (10.0)	12 (40.0)	04 (13.3)	09 (30.0)

$X^2=26.2$; p value= 0.01^*

Conclusion :

In the present study nutritional status was found significantly ($p=0.01$) related with the children's academic performance.

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