Research Article

Prevalence of Malnutrition and its Impact on Academic Performance of School going Children from Rural Area of Rohtak, Haryana

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ABSTRACT

Background: Malnutrition is one of serious public health problem affecting children in developing countries like India. Adequate nutrition during childhood is vital for proper physical and mental development. The purpose of this study was to assess the association of malnutrition with scholastic performance of school going children of rural Rohtak.

Methods: This cross-sectional study was conducted among 392 school children of age 5 to 19 years of village Makrauli in Rohtak, Haryana, India. Malnutrition was assessed using anthropometric measurements and school records were used to analyse scholastic performance. Values of height, weight and BMI were recorded and converted into respective Z scores using WHO ANTHRO PLUS software. Z scores were categorized into <-3SD, -2SD to -3SD, Normal and >2SD according to WHO 2007 Z score charts.

Result: A total of 392 children across 2 private schools and 1 government school were evaluated. In our study 27.5% children were found to be underweight. Stunting was present in 66 children (16.8%). Wasting was found 23.7%. Significant association between malnutrition and academic performance was observed.

Conclusion: Present study established a positive relationship between nutritional status and academic performance. Malnutrition is a major limiting factor for overall development of children.

Keywords: Malnutrition, Academic Performance, Undernutrition

Introduction

Malnutrition is a major public health problem in developing countries like India. India constitutes one third of the total malnourished children in the world.[1] As per National Family Health Survey 4 (NFHS-4) data, the children under 5 years of age are underweight, stunted and wasted as 36%, 38% and 21%, respectively.[2] Adequate nutrition during childhood is vital for proper physical and mental development. Malnourished children are less likely to perform well in school and more likely to grow into malnourished adults. In India, government has taken steps to combat malnutrition among school children, by providing them 'mid-day meal'.

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But mid-day meal is provided only in the government schools but not in private schools. The present study was carried out to estimate the nutritional status of 5 to 19 year-old children in both private and government schools of randomly selected village from rural area of Rohtak (Haryana, India). Through this study, we intended to assess the nutritional status of both government and private school children and, at the time, assessed the relation of their nutritional status with academic performance.

Methods

This cross-sectional study was carried out in 5 to 19 year-old school-going children of village Makrauli, Rohtak, Haryana, India from October, 2018 to November, 2018. All the schools (both government and private) of village Makrauli were included in study. No school was excluded to prevent selection bias. Universal sampling technique was adopted for selection of schools and children to avoid selection bias. All the students of 5 to 19 years of age, who were present in schools at the time of visit and whose parents had given consent, were included in the study. Prior permission was taken from respective school principal. It was an observational study. However, all the ethical issues were taken into due consideration.

Height was taken using non-flexible metallic tape with minimum error of 1 mm and weight was taken using electronic digital weighing scale with minimum error of 100 g with standard precautions, same instruments were used throughout the study. Data was collected using pre-tested, pre-designed, semi-structured questionnaire (Table 1).

Table 1. Proforma for data collection

Name of school
Date
Name of student
Age & Sex
Present class
Last class Score as percentage
Weight
Height

Values of height, weight and BMI were recorded and converted into respective Z scores using WHO ANTHRO PLUS software. Z scores were categorized into <-3SD, -2SD to -3SD, Normal and >2SD according to WHO 2007 Z score charts.

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

Underweight: Children with weight for age Z score below 2 SD from the median of the reference population were considered to be underweight for their age.

Stunting: Children with height-for-age z-scores below 2 SD from the median of the reference population are considered short for their age or stunted.

Wasting: Children with BMI-for-age z-scores below 2 SD from the median of the reference population were considered thin, those with Z scores above 1 SD from the median of the reference population were considered overweight and while those with Z scores above 2 SD from the median of the reference population were considered obese.

Weight for Age Z (WAZ) score were taken only up to 10 years while Height for Age Z (HAZ) score and Body Mass Index for age Z (BMIZ) score were taken for all 5 to 19 years old children.

Academic performance was assessed using compiled report card available with respective class teachers. Overall scores were categorized into good (>70%) and poor (≤70%).

Collected data were coded appropriately, entered into MS Excel sheet and analyzed using SPPS 20.0 version. Chi-square test was used for statistical analysis considering p value <0.05 as significant.

Result

In our study, 215 (54.85%) were males and 177 (45.15%) were females. The nutritional status of students has been described in Table 2.

The prevalence of malnutrition observed is shown in Table 3.

The malnutrition of children was more in government school as compared to private schools (Figure 1).

The nutritional status was significantly associated with academic performance as depicted in Table 4.

Table 2. Nutritional status of students

Nutritional status of students				
Z Scores	>2 SD	N	-2 to - 3 SD	<-3 SD	Total
WAZ*	3	192	65	9	269
HAZ**	0	326	53	13	392
BMIZ**	2	297	82	11	392

*WAZ, weight for age Z score; ****HAZ**, height for age Z score; *****BMIZ**, body mass index for age Z score; N, normal

Table 3. Prevalence of malnutrition

Category	Number of students	Percentage
Under wt	74	27.5%
Stunting	66	16.8%
Wasted	93	23.7%

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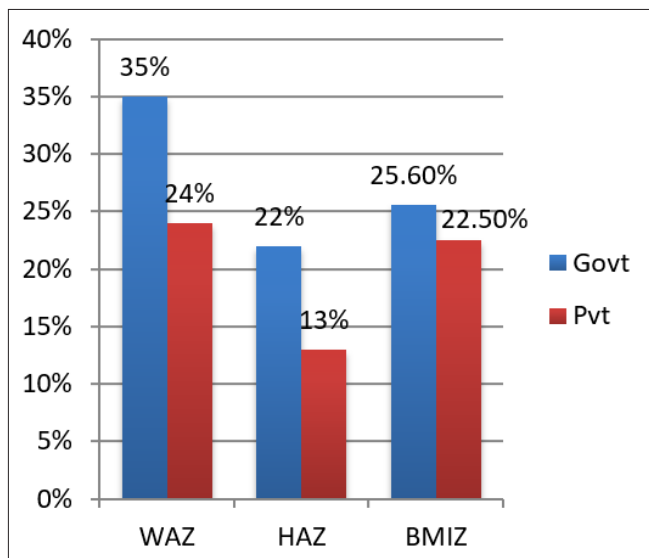*Epidem. Int. 2019; 4(4)*

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Figure 1.Comparison of malnutrition between government and private schools

Table 4.Impact of malnutrition scholastic performance

Impact of under nutrition on scholastic performance					
		Good	Poor	Total	X², df, p-value
Wt	Normal	144	51	195	4.36, 1. 0.036
	Under wt	45	29	74	
Ht	Normal	237	89	326	11.54, 1, 0.0006
	Stunting	34	32	66	
BMI	Over wt	17	7	24	10.51, 2, 0.005
	Normal	203	72	275	
	Wasted	52	41	93	

Discussion

The prevalence of malnutrition and its determinants were assessed in our present cross-sectional study. In our study 27.5% children were found to be underweight, using WHO 2007 standards. These results are comparable to the studies done by Agarwal et al. and Singh et al. which reported prevalence as 29% and 28.9% respectively.[3,4] A study conducted by Bhoite et al. among rural children revealed higher prevalence of underweight (64%).[5] On the other hand, Rashmi et al. revealed lower prevalence rate (20%).[6]

Stunting was present in 66 children, giving prevalence of 16.8%. The results are comparable to studies by Rashmi et al., Agarwal et al. and Singh et al., which reported prevalence of 7%, 12% and 21.8%, while a higher prevalence was reported by Clinical, Anthropometry and Biochemistry (CAB Uttar Pradesh) as 62%.[6,3,4,7]

In the present study, the wasting was found to be 23.7% which was comparable to the study by Agarwal et al., which reported prevalence as 22%.[3] While the study by Rashmi et al. reported prevalence 34%.[6]

Prevalence of obesity in our study was 1.1% which is comparable to the studies done by Rashmi et al. (1%) and Agarwal et al. (2%).[6,3]

Weight for age, height for age and BMI for age were compared with academic performance. It was found to be statistically significant ($p < 0.05$) and the results were comparable to findings by Rashmi.[6]

Conclusion

Present study established a positive relationship between nutritional status and academic performance. Malnutrition is a major limiting factor for overall development of children. In today's competitive world, where there is almost no scope for an average child, poor academic performances due to malnutrition can snatch away bright and beautiful future from children.

Recommendation

Our study recommends that regular health check-ups should be conducted at schools involving school authorities and doctors. All teachers and parents should be given health and nutritional education sessions by the health experts by conducting seminars or interactive health talks to enforce healthy eating habits among children. Parents should be informed about the health status of their children by class teachers during parent teacher meetings and appropriate measures should be taken to improve the lunch pack. National supplementation policy should also include private schools. More detailed studies are needed to determine the factors affecting diet of children apart from Mid-Day Meal.

Limitation

Academic performance is affected not just by nutrition, but also by other factors like social environment, study environment, hereditary factors, and the like but our study focused on nutritional component only.

Conflict of Interest: None

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