A Cross Sectional Study to Assess Nutritional Status, and Utilization of School based Nutrition Interventions in Urban School Children in Turkapally, Telangana, India

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ABSTRACT

Introduction: General malnutrition and specific micronutrient deficiencies are common in school children. They contribute to decreased learning capacity, lower productivity and higher child mortality. Nutrition Interventions at school-age offers direct benefits, because malnutrition is rapidly reversible. Current study focuses on assessment of nutritional status and utilization of school based nutrition intervention programmes like Mid day meal program, National Iron plus initiative with deworming and Vitamin A supplementation. The current study aims to assess nutritional status in urban school children by clinical examination and anthropometric measurements and to assess utilization of school based nutrition interventions in urban school children**.**

Material and methods: A cross sectional study done in randomly selected 1 private and 3 government schools (50% of entire schools) in Turkapally (urban) in June 2019 to December 2019. A total of 438 school children were assessed with a pretested semi structured questionnaire which included socio demographic data, clinical assessment, anthropometric measurements, and school based nutrition interventions.

Results: BMI (WHO Z scores) was normal in 53.1% school children of which 25.3% & 27.8% belong to Govt. & Private schools respectively. Clinically pallor followed by Vitamin B deficiency (37.9%, 22.7% of total school children respectively) were the most common deficiencies detected. Multiple Micronutrient deficiency was observed in 26.3% of school children. Mid day meals, IFA and albendazole supplementation were received by 100%, 9% and 95.7% of government school children and only albendazole by 96.8% of private school children.

Conclusion: Micronutrient supplementation needs to be strengthened. Dietary diversification at community level should be motivated.

Keywords: Malnutrition, School Children, School Based Nutrition Intervention Programmes, Micronutrient Deficiency.

INTRODUCTION

Malnutrition has been defined as "a pathological state resulting from a relative or absolute deficiency or excess of one or more essential nutrients". It comprises four forms -undernutrition, overnutrition, imbalance and the specific deficiency.[1] (1) Undernutrition: This is the condition which results when insufficient food is eaten over an extended period of time. In extreme cases, it is called starvation. (2) Overnutrition: This is the pathological state resulting from the consumption of excessive quantity of food over an extended period of time. (3) Imbalance : It is the pathological state resulting from a disproportion among essential nutrients with or without the absolute deficiency of any nutrient. (4) Specific deficiency : It is the pathological state resulting from a relative or absolute lack of an individual nutrient.[2]

General malnutrition and specific micronutrient deficiencies are common in school children. They contribute to decreased learning capacity, lower productivity and higher child mortality. The nutritional status of school-aged children impacts their health, cognition, and their educational achievement.[3] All countries suffer from at least one form of malnutrition. Many children around the world especially from low income countries start school already stunted, underweight and/or suffering from multiple micronutrient deficiencies.[4]

WHO estimates that about one third of the world's children are affected by protein-energy malnutrition; 76% of these children live in Asia (mainly southern Asia).[5] National Family Health Survey 4 (NFHS 4) data suggests that India is in the process of nutrition transition, where the dual burden of malnutrition – i.e. overnutrition and undernutrition is beginning to be seen in some groups. There is a relatively small, but increasing percentage of overweight children who are at greater risk for non-communicable diseases such as diabetes and cardio-vascular heart disease. As per estimation of World Bank, childhood stunting may result in a loss of height among adults by 1%, which may further lead to a reduction in individual's economic productivity by 1.4%. [6]

Many governments, multilateral and bilateral organizations, recognize that good health and nutrition of school age children contribute to educational achievement, growth,

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and development. (i) disease affects education throughout childhood; (ii) improving children's health and nutrition brings substantial benefits for education; (iii) improving health and nutrition brings greatest benefits to the poor and most vulnerable; and (iv) health and education reinforce one another.[7] Schools are a practical platform to deliver an integrated package of interventions, such as nutritious meals or snacks, micronutrient supplements or on-site fortification, infection control, health promotion, and life-skills education, to improve the health and nutrition. School children who have participated in school nutrition activities can further act as influencers, with a particular impact on their families and younger siblings, potentially reducing the number of children starting school already malnourished.

School based nutrition interventions includes, Mid Day Meals Scheme (Food Supplementation by Ministry of Human Resource Development MHRD) & RMNCH+A encompassing programmes for the control of Micronutrient Deficiencies (Vitamin A supplementation, National Iron plus initiative with deworming by Ministry of Health and Family Welfare MOHFW) provided to school children in only in Government (Govt.) and Govt. aided schools except with deworming which is done in private schools also.

As per National Nutritional Monitoring Bureau report,(NNMB) urban Nutrition report 2017, the nutritional status of adolescents revealed that the prevalence of thinness was more among boys than the girls. Overall, nearly 25% of the boys (5-9 year: 24%, 10-13 year: 27%, and 14-17 year: 26%) and 18% of girls (5-9 year: 19%, 10-13 year: 20%, and 14-17 year: 14%) were found to be thin.[9] In study by Kwabla et, al done in Ghana, prevalence rates of overweight and thinness were found to be higher among children in schools on the school feeding programme compared to children in schools without the feeding programme. And also mentioned that evaluation of the implementation of the school feeding programme is recommended for future studies.[10]

There is a lack of data on the actual nutritional status of school going children and the utilization of the services (Mid day meal program, National iron plus initiative with deworming) especially in this area which the current study deals with. Monitoring of the nutritional status of the population is an important aspect of any nutrition programme. It helps to assess the impact of nutrition intervention and overall development.

Objectives

1. To assess nutritional status in urban school children by clinical examination and anthropometric measurements.
2. To assess the utilization of school based nutrition interventions in urban school children.

MATERIAL AND METHODS

A cross sectional descriptive study was conducted in schools in Urban field practice area of our medical college at turkapally, telangana, India for the time period June 2019 to December 2019 on Government and Private school children.

Study sample: 438 school children from 3 govt. schools and 1 private school (considering 4PQ/L2 where P= Prevalence of malnutrition taken as 50% (Maximum allowable prevalence) Q=1-P, L=Precision (10%) n=400.

Sampling method: In Turkapally urban total 2 private and 6 government schools are present

Schools selected – 1 private and 3 government schools were selected by simple random sampling method (50% of total private and government schools in turkapally respectively).

School children included – all the children who were present at the time of study were included.

Data collection: After obtaining permission from institutional ethical committee, district educational officer siddipet and informed consent from headmasters of all schools, data was collected by using pre designed semi structured questionnaire by Interview method, observation of school health cards and clinical examination and anthropometric measurements.

Data on socio demographic variables, academic performance and school based nutrition interventions received in past 1 year was collected by interview method and information available from school health cards. Nutritional assessment was done clinically by head to toe examination, and anthropometric measurements.

Procedure: Anthropometric measurements on weight, height were taken by trained field workers. Each child's height and weight were measured in the metric system, using standardized technique. A stadiometer (measuring rod) capable of measuring to an accuracy of 0.1 cm was used to measure height of the subjects. The subject was made to stand without footwear with the feet parallel and with heels, buttocks, shoulders, and occiput touching the measuring rod, hands hanging by the sides. The head was held comfortably upright with the top of the head making firm contact with the horizontal head piece. A portable balance with an accuracy of 100 g was used to record the weight of the subjects. Children were instructed to stand on the balance with light clothing and without footwear and with feet apart and looking straight. Weight was recorded to the nearest value. BMI was calculated and children were categorised, based on WHO BMI Z scores 2007.[11]

Data analysed using MS excel and SPSS 20, Chi-square statistic test used and p <0.05 was taken as statistically significant.

Materials used were predesigned semi structured questionnaire, stadiometer and weighing machine, pen torch, measuring tape.

RESULTS

In the current study 438 school children from 3 govt and 1 private school children were assessed. Mid day meals and IFA supplementation were provided in 3 and 2 government schools respectively, where as Deworming was done in school children in all 4 schools. None of the govt. schools received Vitamin A supplementation. All the govt. schools used iodized salt for cooking mid day meal.

Mean age of study sample was 11.2 years. Majority (285/58% of total school children) belonging to 11- 14 year age group.

Male school children (52.3%) being slightly more in number, many of the school children were hindus (64.4%), academic performance of 12.8% of school children was below average of which 8.7% belong to govt. school. 47.3% and 41.8% of school children have illiterate mother and illiterate father respectively (shown in table 1).

In this study based on WHO BMI Z scores (2007) 53.2%, 26.3%, 20.6% were normally nourished, undernourished and over nourished respectively, with Undernutrition being most prevalent form of malnutrition in the entire school children. Under nutrition and over nutrition was found to be more in government and private schools respectively (shown in figure 1).

Anaemia (122/37.9%) followed by vitamin B deficiency (97/22.7%) were the common specific micronutrient deficiencies detected clinically. Only 2(0.4%) and 1(0.2%) school children have vitamin C and Vitamin D deficiency. None of the school children have thyroid enlargement. Multiple micronutrient deficiencies were seen in 115(26.3%) school children (shown in figure 2).

All the government schools were serving mid day meals & iodized salt was being used for cooking mid day meals, IFA supplementation was given only in one government school in the past 1 year that is only 40 (21.3% of government school children, which was 9% of entire school children) school children received IFA supplementation. None received Vitamin A supplementation. Deworming was done in majority of both govt. & private school children (shown in table 2).

In this study abnormal BMI was more prevalent in male children, private school children, in children with academic performance below 60% and illiterate mother which was statistically significant. No significant relationship associated with high prevalence of abnormal BMI in children of primary school. The slight higher prevalence of micronutrient deficiency in males and government school children was not statistically significant. Children with illiterate mothers (43.2%) and primary school age (47.2%) have more prevalence of micronutrient deficiency which was statistically significant. 53.6% of school children

Socio demographic variable	Type of school		
	Government (n=188/42.9%)	Private (n=250/57.1%)	Total (n=438/100%)
Age			
5 - 7years	18 (4.1%)	3 (0.7%)	21(4.8%)
7- 10 years	64 (14.6%)	99 (22.6%)	163(37.2%)
11-14 years	106 (24.2%)	148 (33.8%)	254(58%)
Sex			
Female	82 (18.7%)	127(29%)	209(47.7%)
Male	106(24.2%)	123(28.1%)	229(52.3%)
Class			
(I- V)	102(23.3%)	114(26%)	216(49.3%)
(VI-X)	86(19.6%)	136(31.1%)	222(50.7%)
Religion			
Hindu	108(24.7%)	174(39.7%)	282 (64.4%)
Muslim	37(8.4%)	38(8.7%)	75(17.1%)
Christian and others	43(9.8%)	38(8.7%)	81(18.5%)
Academic performance			
Academic score >60%	150 (34.2%)	232 (53%)	382(87.2%)
Academic score <60%	38(8.7%)	18(4.1%)	56(12.8%)
Mother's literacy			
Illiterate	148(33.8%)	59 (13.5%)	207 (47.3%)
class I – class V	32(7.3%)	94(21.5%)	126(28.8%)
class V and above	8 (1.8%)	97(22.1%)	105(23.9%)
Father's literacy			
Illiterate	107(24.4%)	76(17.4%)	183 (41.8%)
Class I – class V class	43 (9.8%)	36 (8.2%)	79 (18%)
Class V and above	38 (8.7%)	138 (31.5%)	176 (40.2%)

Table-1: Distribution of school children by sociodemographic data

Nutrition interventions	Government (n=188)	Private (n=250)
Mid day meals	188 (100%)	Not applicable
Iron folic acid supplementation	40(21.3%)	0%
Vitamin A supplementation	0%	0%
Deworming	180 (95.7%)	242 (96.8%)
Iodized salt used in mid day meals	188 (100%)	Not applicable

Table-2: Distribution of school children by utilization of School based Nutrition interventions in the past 1 year

General characteristics	BMI normal (Normally nourished) 233 (53.2%)	BMI abnormal (underweight + overweight) 205 (46.8%)	Micronutrient deficiency present (176/40.2%)	Micronutrient deficiency absent (262/59.8%)	Total (438/ 100%)
Gender					
Male	108 (24.7%)	121 (27.6%)	90(20.6%)	139(31.7%)	229 (52.3%)
Female	125 (28.5%)	84 (19.2%)	86(19.6%)	123 (28.1%)	209 (47.7%)
p value/ X^2 (Chisquare statistic)	<0.001/ 7.0198 - significant		0.69/ 0.1551 - not significant		
Type of school					
Govt. school	111(25.3%)	77 (17.6%)	79(42%)	109 (58%)	188 (42.9%)
Private school	122 (27.9%)	128 (29.2%)	97(38.8%)	153 (61.2%)	250 (57%)
p value/ X^2 (Chisquare statistic)	0.03/4.5215 - significant		0.49/ 0.4632 - not significant		
Mother's literacy					
Mother literate	70 (16%)	35 (8%)	32(7.3%)	73 (16.7%)	105 (24%)
Mother illiterate	163 (37.2%)	170 (38.8%)	144(32.9%)	189 (43.1%)	333 (76%)
p value/ X^2 (Chisquare statistic)	10.06/0.0015 - significant		0.01/5.4135 - Significant		
Class of student					
Primary school (I-V)	108(24.6%)	108(24.7%)	102 (47.2%)	114 (52.8%)	216 (49.3%)
Secondary school (V-X)	125 (28.6%)	97 (22.1%)	74 (33.3%)	148 (66.7%)	222 (50.7%)
p value/ X^2 (Chisquare statistic)	0.18/ 1.7487 - not significant		0.003/ 8.7862 significant		
Academic performance					
Academic score >60%	196(44.7%)	186(42.5%)	146(33.3%)	236(53.9%)	382 (87.2%)
Academic score < 60%	37 (8.4%)	19 (4.4%)	30(6.9%)	26 (5.9%)	56(12.8%)
p value/ X^2 (Chisquare statistic)	0.03/4.275 significant		0.02/4.7887 significant		

Table-3: Distribution of school children by general characteristics vs BMI & micronutrient deficiency

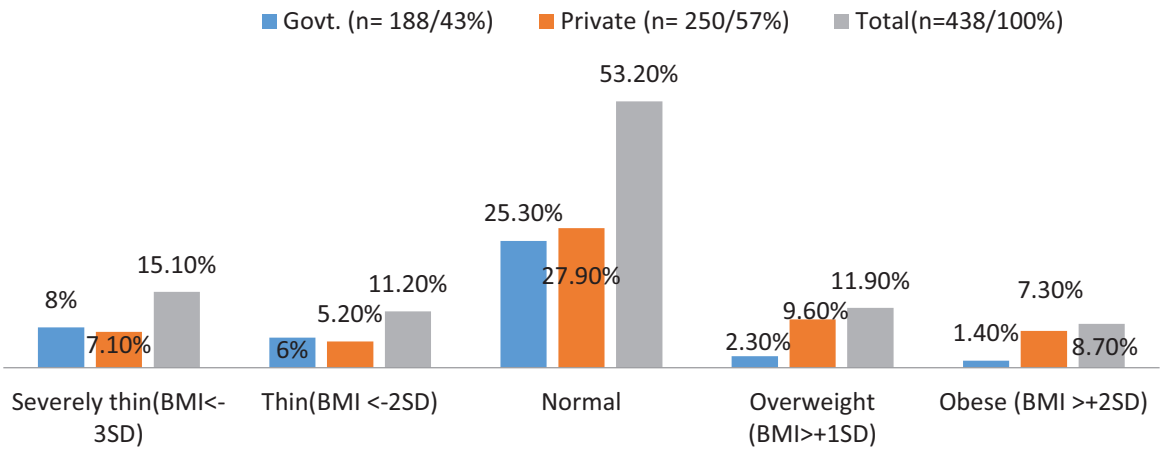

Figure-1: Distribution of school children based on BMI

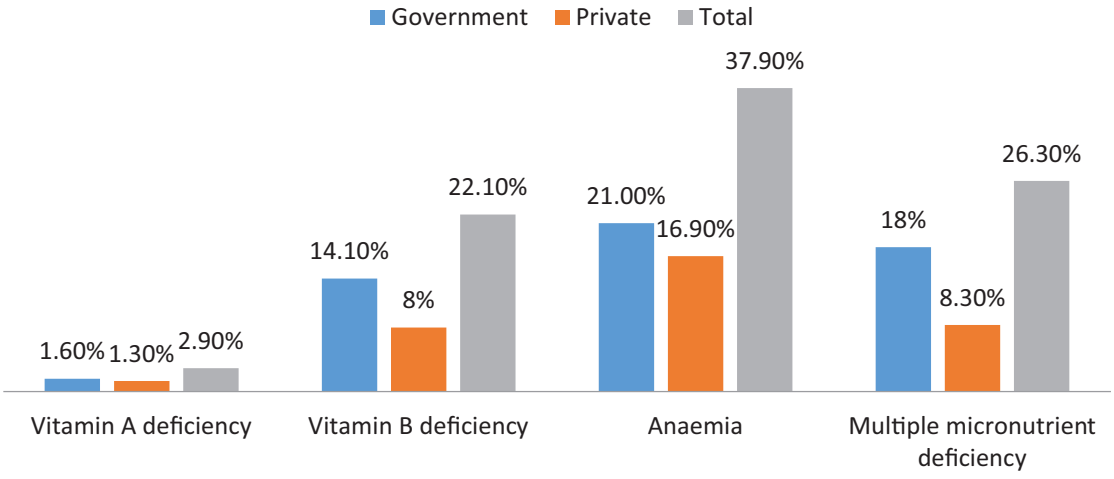

Figure-2: Distribution of school children by micronutrient deficiencies by clinical examination

whose academic performance was below average were micronutrient deficient.

DISCUSSION

In the current study prevalence of undernourished school children was 26.3% which was slightly lower when compared with studies by Chajhlana et al and Abhishek Agarwal et al, where prevalence of underweight was 28.9% and 29% respectively.[12, 13]

In the current study overweight and obesity was higher 11.9% and 8.9% respectively when compared with a study by Chajhlana et al. where overweight was present in 9.2% and obesity in 4.4% in urban school children also when compared with study conducted by Dabone C et al where Overweight/obesity was low (2.3%).[12, 14]

Clinical pallor was prevalent in 37.9% of school children in current study which was slightly higher to findings of study by Bharathi et al (30%) in rural school children and low in comparison with study by Avula Laxmaiah et al (70%) in rural school children.[15,16] In contrast prevalence was low 15.9% in study by Chajhlana et al.[12]

Vitamin A deficiency was clinically found in 2.9% of school children which was very low in this study when compared with study by Dabone C et al where the prevalence was 38.7%. [14]

Only 2(0.4%) and 3(0.6%) school children have clinical vitamin C and Vitamin D deficiency in the present study, when compared with a study by Bharathi et al where prevalence was 2% and 12% respectively in rural children.[15]

None of the school children have thyroid enlargement in this study which was similar to study by Bharathi et al in rural school children.[15] In this study 115(26.3%) have multiple micronutrient deficiencies.

In the present study prevalence of malnutrition was significantly high in primary school children and whose mothers are illiterate which was similar to a study by Rajesh Kunwar et, al. that education of parents as well as that of mothers and fathers separately has a direct relationship with nutrition i.e. with the improvement in the educational standard, the nutritional status of children also improved. This could be because of the greater role of educated parents in pursuing the appropriate strategy in making greater share of household resources available to children.[17]

In this study mid day meals were served to all the school children in government schools. Only 40 (9% of entire school children) school children received IFA supplementation. Deworming was done in 96.3% of entire school children. None received Vitamin A supplementation which shows poor micronutrient supplementation. Treating neglected worm diseases is an essential first step to good health, but antihelminthic drugs need to be integrated with simple and inexpensive nutritional interventions such as micronutrient supplements to promote recovery and have a rapid effect. If they are not, the effect of deworming on growth and micronutrient status could take so long to achieve, that the benefit of treatment might not be readily apparent, and this could affect support for programmes from governments and communities alike. [18]

Limitations: Present study is a cross sectional study with some part of the data collected from school health cards (secondary data), hence only utilization of programmes was assessed. To understand programme implementation and effect longitudinal study for further research is recommended.

CONCLUSION

According to WHO BMI Z scores 53.2%, 26.3%, 20.6% of entire school children were normally nourished, undernourished and over nourished respectively. Under nutrition and over nutrition was found to be more in govt. and private schools respectively which was statistically significant, which shows nutritional insecurity. Anaemia (122/37.9%) followed by vitamin B deficiency(97/22.7%) were the common specific micronutrient deficiencies detected in school children. 115(26.3%) school children have multiple micronutrient deficiencies. IFA (9% of total school children) and Vitamin A supplementation was very poor. Iodized salt used in Mid day meal program contributing for the absence of iodine deficiency disorder. Children with illiterate mothers (43.2%) and primary school age (47.2%) have significantly more prevalence of micronutrient deficiency when compared to literate mothers (30.3%) and secondary school age (33.3%). Micronutrient deficiency was associated with 62.7% of school children whose academic performance was below average.

RECOMMENDATIONS

Integrated approach for IFA & Vitamin A supplementation along with deworming needs to be considered to restore the micronutrients deficits. The Nutritional implementation framework should be used to recognise the challenges associated with implementation and utilization of services. Unequal distribution due to variation in availability, accessibility and purchasing power leads to nutrient insecurity which needs to be dealt with. Dietary diversification at community level needs to be motivated. Capacity development, in school management and other personnel, to gain knowledge and act as agents of change for positive nutritional behaviour.

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