ORIGINAL ARTICLE
pISSN 0976 3325 | eISSN 2229 6816
Open Access Article
www.njcmindia.org

ASSESSMENT OF NUTRITIONAL STATUS (WITH WHO REFERENCE STANDARDS) AND HEALTH STATUS AMONG RURAL PRIMARY SCHOOL CHILDREN OF ANAND DISTRICT, GUJARAT

Donald S Christian[1], Sidhyartha Mukherjee1[1]

Financial Support: None declared
Conflict of Interest: None declared
Copy Right: The Journal retains the copyrights of this article. However, reproduction of this article in the part or total in any form is permissible with due acknowledgement of the source.

How to cite this article:
Christian DS, Mukherjee S. Assessment of Nutritional Status (with WHO Reference Standards) and Health Status among Rural Primary School Children of Anand District, Gujarat. Ntl J Community Med 2016; 7(10):838-841.

Author's Affiliation:
[1]Assistant Professor, Community Medicine, GCS Medical College, Ahmedabad; [2]Professor & Head, Community Medicine, Parul Institute of Medical Sciences and Research , P.O.Limda, Ta: Waghodia, Dist. Vadodara,

Correspondence:
Dr. Donald S. Christian
donald_christian2002@yahoo.com

Date of Submission: 13-10-16
Date of Acceptance: 26-10-16
Date of Publication: 31-10-16

ABSTRACT

Background: Health and Nutritional status school age children of 5-19 years of age are not focused as much as under 5 in India. School age is the foundation of active and productive life for an individual.

Methodology: A cross sectional study was done among the enrolled school children (STD 1-7) of a government rural primary school of a village of Anand district, Gujarat. Trained teachers of the school were engaged in measuring height and weights in a standardized way. Measures like BMI for age and Height for age were compared with the WHO growth standards (2007).

Results: Among a total of 291 school children (161 boys and 130 girls), for many age groups, more than 80% of children of the groups, were falling below median-2SD of the WHO standards, both for BMI for age and height for age. This was seen more among boys than for girls. The overall prevalence of anemia was 29.20%.

Conclusion: Majority of rural primary school children, suffer from significant level of inadequate growth, in terms of body mass and stature. Due to variations in social and economic conditions, the health and nutrition status should be focused for school aged children through more stringent efforts.

Keywords: Nutritional status, rural primary school children, BMI for age, height for age, Anand District, WHO reference standards.

INTRODUCTION

The problem of inadequate growth has been studied extensively mostly for preschool or under 5 children in many developing countries like India[1]. According to the UNICEF, under-nutrition not only slows down children's progress but also it slows down nation's progress towards development goals.[2] India has got the highest number of low birth weight babies with an estimate of about 7.4 million[3]. The national standards for height, weight and BMI are also devised only for under 5 ages. School age children (5-15 years) have not received equal attention from policy makers[4]. But this nutrition problem should also be focused on age group 5-19 or school age group equally. The first reason behind is that school age population in India has gone up from 19.2 m in 1950 to 113.8 m in 2000[5]. There have been so many ups and downs in the prevalence of under-nutrition among the school aged children of India for the last three decades[6]. Secondly, the physical growth is very rapid in this age group. It has been estimated that about 22% of the burden of total malnutrition of India is by School age children.[7] Thirdly, there exist several social and economic differentials among rural and urban school children. The concept of school health services has been identified as a powerful tool for

improving health of the school children & the whole community. But in a country like India, lack of resources jeopardizes delivery of optimal and comprehensive school health services, thus exposing the school children to malnutrition, anemia & a host of communicable and other diseases. The current situation needs to be studied in underprivileged rural primary school children, as their future health would also depend on their current growth. Objectives: To study the overall nutritional status (in terms of BMI and height) and health status of the rural primary school children of the village & to detect the prevalence of ill-health among the school children.

MATERIALS AND METHODS

The study was done in a government primary school of a village Borsad taluka of Anand district, during the 5 day rural posting program for undergraduate medical students of a rural medical college through the Department of Community Medicine. The school visit was a pre-planned affair keeping all the necessary permissions from the institute as a part of academic research. The principal was approached beforehand and informed consent was obtained to do the study. All the teachers were trained by the investigator team for measuring height and weight with accuracy.

The sample size was determined keeping in the mind the prevalence of malnutrition of 50%, precision of 10% at CI of 95%.(n=384). But after that, all the students were enrolled and thus the sample size was adjusted for 291 enrolled students only to maintain uniformity. The measurements were taken with help of school teachers. The teachers measured weights on the scale and heights on a wall which was marked by scale through measure tape. Students of each class were involved, taking care of the absentees also, by measuring their findings on other day, as the batch stayed there for 5 working days. The medical undergraduates from groups of about 7 in each group and covered all the classes in total, in the supervision of other senior faculties. They detected signs of pallor, ill-health, symptoms of diseases as well as ill-habits, by personal observations and interviewing children. The teachers were also asked questions for confirmation of ill-health and for detection of ill-habits of their respective children. Pallor was detected clinically. All the findings of the medical students and teachers were well supervised and cross-checked by the faculties.

The information was recorded on well-designed forms, for each class, having information like age, gender, height, weight, pallor, ill-health and ill-habits on it for every child. The age of the child was noted by teachers from the school records. All the information was entered in data sheets in computers. BMI (Body Mass Index) was calculated for every school child. The information was analyzed using SPSS package. The data were analyzed by using z-test for finding means and standard deviations for heights and BMIs for different ages (nutritional status). They were compared with known WHO standards [8] for same ages. The data for girls and boys were dealt separately as there are different standards for both genders. The prevalence of ill-health and ill-habits were also calculated among both sexes. They were also examined for prevalence of pallor and other ill health.

RESULTS

A total of 291 students were surveyed and examined for the study. It includes 161 boys and 130 girls from the respective standards of 1-7. The mean heights for boys and girls for all ages were 120.59 cm (SD=14.74 cm) and 120.25 cm (SD=13.31 cm), respectively. In the same way, the mean weight for boys and girls of all ages were 19.63 kg (SD=5.74 kg) and 19.51 kg (SD=5.35 kg) respectively. The distributions of heights for age and BMI for age are given in tables separately for boys and girls. [Table 1, Table 2].

Table 1: Distribution of Body Mass Index (BMI) and Height for age scores among boys, with their corresponding reference values of WHO for same age.

Age	N	BMI for age		WHO[6] Standards		Below 2SD	Height for age		WHO[7] Standards		Below 2SD
(yrs)		Mean	Mean±2SD	Mean	Median±2SD	(from WHO)	Mean	Mean ± 2SD	Mean	Median±2SD	(from WHO)
6	9	15.89	13.65-18.13	15.3	13.0-18.5	0(0.00)	103.4	98.44-108.44	112.91	103.4-122.4	4(44.44)
7	22	13.4	9.0-17.8	15.48	13.1-19.0	10(45.45)	104.9	94.12-115.6	121.73	111.2-132.3	20(90.90)
8	24	13.03	7.61-18.45	15.73	13.3-19.7	14(58.33)	108.4	97.41-119.37	127.26	116.0-138.6	22(91.66)
9	21	12.82	10.32-15.32	16.04	13.5-20.5	15(71.42)	116.4	100.66-132.18	132.56	120.5-144.6	15(71.42)
10	25	13.13	9.83-16.43	16.44	13.7-21.4	20(80.00)	123	108.5-137.5	137.77	125.0-150.5	12(48.00)
11	17	13.15	11.43-14.87	16.93	14.1-22.5	16(94.11)	126.9	116.09-137.73	143.11	129.7-156.6	11(64.90)
12	15	12.74	9.06-16.42	17.53	14.5-23.6	12(80.00)	137.1	121.68-152.52	149.08	134.9-163.3	8(53.33)
13	14	13.49	10.57-16.84	18.23	14.9-24.8	13(92.85)	135.2	108.99-161.43	156.04	141.2-170.9	8(57.34)
14	6	13.35	10.35-16.35	19	15.5-25.9	5(83.33)	141.9	123.75-160.07	163.18	147.8-178.6	5(83.33)
15	4	13.12	8.26-17.98	19.77	16.0-27.0	3(75.00)	134.8	90.17-179.33	168.95	153.4-184.6	3(75.00)
16	2	15.3	14.6-16.0	20.49	16.5-27.9	2(100.00)	151.3	147.73-154.77	172.89	157.4-188.4	2(100.00)
17	2	13.63	7.11-20.15	21.14	17.0-28.8	2(100.00)	127.5	113.36-141.64	175.16	159.9-190.4	2(100.00)

Table 2: Distribution of Body Mass Index (BMI) and Height for age scores among girls, with their corresponding reference values of WHO for same age.

Age (yrs)	N	BMI for age		WHO[6] Standards		Below 2SD (from WHO)	Height for age		WHO[7] Standards		Below 2SD (from WHO)
		Mean	Mean ± 2SD	Mean	Median ± 2SD		Mean	Mean ± 2SD	Mean	Median ± 2SD	
5	3	14.71	10.79-18.33	15.24	12.7-18.9	1(33.33)	106.3	95.33-117.33	109.6	100.1-119.1	1(33.33)
6	15	13.9	9.36-18.44	15.26	12.7-19.2	5(33.33)	105.3	95.42-115.1	115.12	104.9-125.4	7(46.66)
7	23	12.37	8.81-15.93	15.4	12.7-19.8	13(56.52)	108.2	96.31-119.99	120.81	109.9-131.7	14(60.86)
8	6	13.54	9.22-17.86	15.68	12.9-20.6	3(50.00)	106.7	98.50-114.82	126.55	115.0-138.2	6(100.00)
9	17	12.44	10.16-14.72	16.09	13.1-21.5	12(70.58)	120	106.78-133.22	132.49	120.3-144.7	11(64.70)
10	18	13.39	10.23-16.55	16.61	13.5-22.6	12(66.66)	122.9	111.25-134.57	138.63	125.8-151.4	13(72.22)
11	17	13.78	9.52-18.04	17.24	13.9-23.7	12(70.58)	126.8	115.36-138.28	144.99	131.7-158.9	12(70.58)
12	15	12.95	9.27-16.63	17.99	14.4-25.0	10(66.66)	135.3	111.14-159.38	151.23	137.6-164.9	7(46.66)
13	10	14.32	6.42-22.22	18.8	14.9-26.2	8(80.00)	133.7	111.70-155.70	156.37	142.5-170.3	5(50.00)
14	4	14.41	10.71-18.11	19.56	15.4-27.3	3(75.00)	140	131.22-148.78	159.78	145.9-173.7	4(100.00)
15	2	15.72	9.12-22.32	20.21	15.9-28.2	1(50.00)	136.5	120.96-152.04	161.66	147.9-175.4	2(100.00)

Table 3: Prevalence of any ill-health among the students (both boys and girls)

Health problem	Frequency (%)	Health problem	Frequency (%)
White spots –skin	15 (5.15)	Ear problem	2 (0.68)
Skin infections	14 (4.81)	Visual/hearing difficulty	2 (0.68)
Addiction	8 (2.74)	Cough	1 (0.34)
Lack of oral care	8 (2.74)	Snake bite	1 (0.34)
Dental problems	4 (1.37)	Dog-bite	1 (0.34)
Clubbing	2 (0.68)	Others	4 (1.37)

The measurements were also compared to the standard reference values from the World Health Organization [6, 7] for the same ages. The numbers of students who fall below the 2SD from WHO reference ranges were also analyzed. It was seen that for many of the age groups, there were significant proportions of children who fall below the desired levels for each age. These observations were also true for girls as well for most of the ages. [Table 2].

The study shows that the prevalence of pallor was 20.48% (n=33) among boys and 40% (n=52) among girls of the same school. The overall prevalence of any ill-health was 26.71% (n=43) among boys and 14.61% (n=19) among girls. The prevalence of ill-health thus was higher among boys. The study also shows that white spots on skin (n=15) and skin infections (n=14) were two most common health problems detected during the survey. [Table 3]. Rest of the ill-heath did not form much proportions.

DISCUSSION

While weight for age is considered as an optimum measure for detecting under nutrition with several studies in India[9, 10], Body Mass Index (BMI) is considered as a better indicator for growth than weight alone for school age children. That was the reason, the WHO has made reference values for Height for Age (to detect stunting) and BMI for age (to detect under-nutrition). The WHO reference 2007[8] thus provides reference values for school aged and adolescent population (5-19 years) along with WHO Child Growth Standards for 0-5 years as well.[11] The study shows, according to BMI for age, the prevalence of significant under-nutrition (below 2 SD from WHO reference values) to be 69.56 % (n=112) for boys and 61.53% (n=80) among girls. On the other hands the prevalence of stunting (height for age below 2 SD from WHO) was 69.56% (n=112) and 63.07% (n=82) for boys and girls, respectively. The study showed there was not much difference of mean weights (19.63 kg for boys and 19.51 kg for girls) among the school children. This finding is different from a study by Srivastava A.et al[12], where the girls had higher weights than boys, though it was not significant statistically. The reason probably would be the samples were from urban schools for that study. The evidence has shown that school going boys are more likely to be stunted and underweight than school aged girls [13, 14], but in the present study, under-nutrition was not significantly more in any of the gender. In a similar study at Nairobi, the girls were however more wasted than stunted[15]. In a recent study by Cynthia S. among urban slums of Andhra Pradesh[16], the prevalence of under nutrition was foud to be 62.38% which is quite comparable to our present study. In another study[4] of rural India, the prevalence of underweight was 57.6 %. There have been huge variations in the prevalence of under-nutrition probably due to varied social and economic circumstance. According to Sengupta P. et al, lack of hyeigine, poor sanitary practices as well as worm infestations are major reasons for development of under nutrition among rural primary school children.[17,18]

In the present study, the prevalence of pallor was found to be 29.20 % overall for boys and girls in total. The findings by Ananthakrishnan et al[4] showed the prevalence of anemia to be 57.1%, which showed a much higher value because of the probability of higher sample size (n=1349) as well as lower socio-economic class of the respondents in the village. In a study by Shrivastava et al[9] and Panda et al[19], the prevalence of anemia was found to be 37.5% and 22.5% respectively. The low prevalence in the present study could also be explained by the fact that the diagnosis of anemia was based on clinical judgment only and no laboratory investigation was relied upon. In the same study though, the prevalence of any skin diseases (65%) and under-nutrition (57%) were considerable higher which is the same case as for the present study.

CONCLUSION AND RECOMMENDATIONS

School age is the foundation of active and productive life for each child. Majority of rural primary school children, suffer from significant level of inadequate growth, in terms of body mass and stature. More appropriate and feasible steps are required among such rural school children, as their socio-economic conditions differ considerably from urban areas. Possible predictors should also be sorted out for such high prevalence of undernutrition among similar children of various settings. School could become a wonderful opportunity to catch up these growth lags among children. School health services should focus more on referrals and just not only on assessments.

REFERENCES

1. Pal D, Kanungo S, Bal B, Bhowmik K, Mahapatra T, Malnutrition Scenario among School Children in Eastern-India-an Epidemiological Study, Epidemiology (Sunnyvale), 2016; 6:228.
2. UNICEF: United Nations International Children's' Fund, Story on Nutrition, 2016; New York : accessed from http://unicef.in/Story/1124/Nutrition on 10/12/2016.
3. International Institute of Population Sciences (IIPS) National Family Health Survey (NFHS-3), Fact sheets for 29 States. Mumbai: International Institute for Population Sciences India; Mumbai; 2007.
4. Ananthakrishnan S., Pani S.P., Nalini P., A Comprehensive Study of Morbidity in School Age Children, Indian Pediatrics, 2001; 38: 1009-1017.
5. UNICEF, United Nations International Children's' Fund, Nutrition, Fact file, 2007; New York: Accessed from www.unicef.org/india
6. International Institute of Population Sciences (IIPS) National Family Health Survey (NFHS-3), Fact sheets for 29 States, Mumbai, 2007; 1-51.
7. Best C, Neufingerl N, Van Geel L, Briel T.V.D, Osendarp S. The nutritional status of school going children: Why should we care? Food Nutr Bull, 2010; 31 (3): 400-417.
8. WHO-World Health Organization, Reference values for BMI and Height for age (z-scores) for 5-19 years children, Geneva, 2007. Accessed from www.who.int/growthref/en.
9. Meshram II, Arlappa N, Balakrishna N, MallikharjunaRao K, Laxmaiah A, et al., Trends in the prevalence of undernutrition, nutrient and food intake and predictors of undernutrition among under five year tribal children in India. Asia Pac J ClinNutr, 2012; 21: 568-576.
10. Meshram II, Laxmaiah A, Gal Reddy Ch, Ravindranath M, Venkaiah K, et al., Prevalence of under-nutrition and its correlates among under 3 year-old children in rural areas of Andhra Pradesh, India. Ann Hum Biol, 2011; 38: 93-101.
11. Onis M, Growth curves for school aged children and adolescents, Indian Pediatrics, 2009; 46: 463-465.
12. Srivastava A, Mahmood S.,Srivastava P M, Shrotriya V P & Kumar B, Nutritional status of school-age children - A scenario of urban slums in India, Arch Public Health. 2012; 70(1): 8. PMCID: PMC3436633.
13. Shahabuddin A. et al. Adolescent nutrition in a rural community in Bangladesh. Indian J Pediatr.2000; 67(2):93–98.
14. The anthropometric status of school children in five countries in the Partnership for Child Development. Partnership for Child Development, Proc Nutr Soc. 1998; 57:149–158.
15. Chesire E. J., Orago A., Oteba L. P., Echoka E., Determinants Of Under Nutrition Among School Age Children In A Nairobi Peri-Urban Slum, East African medical journal, 2008; 85(10):471-9.
16. Cynthia S. S., Nutritional Status of Government Primary School Children in an Urban Slum, Kurnool, Andhra Pradesh. International Journal of Current Medical And Applied Sciences, 2015; 6(3), 167-170.
17. Sengupta P, Philip N, Benjamin A, Epidemiological correlates of under-nutrition in under-5 year's children in an urban slum of Ludhiana. Health and Population: Perspectives and Issues, 2010; 33: 1-9.
18. Deb S, Dutta S, Dasgupta A, Misra R, Relationship of personal hygiene with nutrition and morbidity profile: a study among primary school children in South Kolkata, Indian Journal of Community Medicine, 2010; 35: 280-284.
19. Panda P, Benjamin AI, Zachariah P. Growth and morbidity patterns among rural school children in Ludhiana, Punjab. Health Popul Perspect Issues. 1997; 20(1):20–28.