Nutritional status and various morbidities among school children – A descriptive Study

Desh Dipak Sinha[1], Rakesh Kumar[2], Manisha Kumari[3*]

[1]Assistant Professor, Department of Pediatrics, PMCH, Patna, Bihar, India
[2]Assistant Professor, Department of Pediatrics, PMCH, Patna, Bihar, India
[3]Senior Resident, Department of Pediatrics, PMCH, Patna, Bihar, India

Abstract
Background: Primary school age is a dynamic period of physical growth and mental development of child. Previous research studies indicates that malnutrition and poor health among school children is the common cause of low school enrolment, high absenteeism, early dropout and poor classroom performance. **Aim:** This study was conducted to assess the various morbidities and nutritional status among school children. **Methods:** This descriptive study was conducted on a total of 720 students and were interviewed and examined. A structured questionnaire was used to collect basic information about students. Body weight and height were measured using standardized procedures. WHO criteria for classification of nutritional status was used. Visual acuity and colour vision was assessed using Snellen's chart and Ishihara's pseudo isochromatic chart respectively. Mean scores and proportions were calculated and chi-square test was applied. P value of <0.05 was considered as statistically significant. **Results:** Among 720 student, 372 (51.66%) were males and 348 (48.33%) were females. The mean age of children was 10.2 ± 3.1 years. Among all age groups and both sexes, the observed BMI was lower as compared to the reference values. The prevalence of underweight among children of 5-9 years was (35.4%) and (1.9%) were severely underweight. The prevalence of stunting was 10.0%, including 0.1% of severely stunted children. A total of 30.4% children were thin (low BMI for age). Pallor (39.1%), myopia (34.8%) and dental caries (14.8%) were the common morbidities observed among children. The pallor was observed more commonly among girls and this difference was statistically significant (p value <0.05). **Conclusion:** Under-nutrition is a prevalent condition among school children. Apart from various nutritional programmes, health education to parents, community and school teachers are quite important to address this problem.
Keywords: Nutritional status, School children, Morbidity pattern, India, Bihar.

Introduction
Over 1/5th of our population comprises of children aged 5-14 years. Primary school age is a dynamic period of physical growth and mental development of child. Healthy childhood is the basis for healthy and productive adult life. School is the place where apart from formal education, children also learn behavioral, lifestyle and moral values. Health is one of the key factors determining the enrollment, performance and continuation in school[1]. School health services are considered to be an ideal platform to detect and address health problems in children at earliest. School health services in India dates back to 1909, when for the first time medical examination of school children was carried out.
Early identification of childhood illnesses through regular school health check-ups can prevent complications[2]. It focuses mainly on nutritional disorders and personal hygiene which are important problems in India. According to school health programme of India, school health services include screening of general health, assessment of anemia / nutritional status, visual acuity, hearing problems, dental check-up, common skin conditions, heart defects, physical disabilities, learning disorders, behavior problems etc[3].
Malnutrition is by far the biggest contributor to child mortality, present in half of all cases globally. Childhood malnutrition is a serious issue leading to poor immunity and repeated infections, which again causes malnutrition, continuing the vicious cycle.

*Correspondence
Dr. Manisha Kumari
Senior Resident, Department of Pediatrics, PMCH, Patna, Bihar, India
E-mail: drmanishahailley@gmail.com

Malnutrition and poor health in school children are among the common causes of low school enrollment, high absenteeism, early dropout and poor classroom performance. Hence it is important to assess the morbidity pattern and nutritional status among children.

Materials and method
This Cross sectional observational, descriptive epidemiological study was conducted at Upgraded Department of Paediatric, Patna Medical College and Hospital, Patna. The study was approved by the institutional research and ethical committee. The study was conducted between September 2020 and March 2021. An informed and written consent was taken from the participating subjects prior to the commencement of the study.
All the students present on the day of interview and examination were enrolled in the study. The purpose of study was explained to the school authorities and permission for conducting the study was obtained. The parents of all the students were also informed and those students, whose parents refused to give consent were excluded from the study. All absent students were followed next day and if present, they were interviewed and examined.
A total of 720 students were interviewed and examined. A pre-designed and pre-tested questionnaire was used to interview and examine all the participated students. The questionnaire consisted of socio-demographic details of students, personal hygiene and questions related to common ailments in school age group children. After completion of the questionnaire, anthropometric measurements and physical examination was done. Any specific complaints by the students at the time of examination were also recorded and evaluated accordingly.
Body weight and height were measured following standardized procedures. Weights of the students were recorded using a weighing scale to the nearest 0.1 kilograms (kg). Height was measured to the nearest one centimeter (cm) using stadiometer. Students removed

Sinha *et al*   International Journal of Health and Clinical Research, 2021; 4(21):278-281
www.ijhcr.com
278

their footwear during both these measurements. Weighing scale was calibrated to the zero every time before taking measurement.

World Health Organization (WHO) criteria for classification of nutritional status was used[4]. Students with Z-score value of <2SD (standard deviation) and <3SD for height for age were classified as stunted and severely stunted respectively. Similarly children with Z- score value of <2SD and <3SD for weight for age were classified as underweight and severely underweightrespectively. Children with Z-score value of <2SD and <3SD for weight for height were classified as thin and severely thin respectively or low BMI for age. Nutritionalstatus was also assessed by calculating Body Mass Index (BMI) and comparing with National Health and Statistics report[5].

Visual acuity was assessed using Snellen's chart and Ishihara's

pseudo isochromatic chart was used for the assessment of color vision. Specific examination of skin, eyes, ear, throat, oral cavity, cardiovascular system, respiratory system, abdomen and central nervous system was also done. All the examinations were done by trained doctors. A specific training regarding the examination for children was given to all the investigators. Whenever a health problem was detected, the corresponding class teacher was informed and guided about the due course of action.

All the data were entered in Microsoft excel 2010 and was analyzed using SPSS version 16 for windows. Anthropometric indices were calculated using the new WHO child growth standards. Mean scores and proportions were calculated for continuous and dichotomous variables. Chi-square test was applied tofind the association and a P value of <0.05 was considered as significant.

Results

Among a total of 720 students examined, 372 (51.66%) were male and 348 (48.33%) were female. The age ofstudents ranged between 5 and 17 years. The mean age ofchildren was 10.2 ± 3.1 years. The mean age of male and female students did not differ significantly (Table 1).

Table 1: Age and sex distribution of school children(n=720)			
Age (years)	Sex		Total n (%)
	Male n (%)	Female n (%)	
5	9 (2.1)	8 (2.2)	17 (2.3)
6	59 (15.8)	51 (14.6)	110 (16.2)
7	15 (4.03)	12 (3.4)	27 (3.7)
8	36 (9.6)	39 (11.2)	75 (10.4)
9	60 (16.1)	45 (12.9)	105 (14.5)
10	30 (8.06)	42 (12.06)	72 (10)
11	24 (6.4)	25 (7.1)	49 (6.8)
12	27 (7.2)	23 (6.6)	50 (6.9)
13	60 (16.1)	41 (11.7)	101 (14.02)
14	24 (6.4)	27 (7.7)	51 (7.08)
15	14 (3.7)	19 (5.4)	33 (4.5)
16	8 (2.1)	12 (3.4)	20 (2.7)
17	6 (1.6)	4 (1.1)	10 (1.3)
Total	372 (51.66)	348 (48.33)	720 (100.0)

Nutritional status of school children

The BMI of the boys is shown in Table 2. Among all age groups, the observed BMI was lower as compared to the reference values. This suggests that the under-nutrition is distributed across all the age groups. The difference of BMI among various age-groups is statistically significant (P <0.001).

Table 2: BMI of boys according to their age and comparison with reference BMI value					
Age (Years)	No. of students	MeanBMI value	Standard deviation	Reference BMI value	Difference of mean BMI andreference BMI
5	9	15.4	2.0	16.2	0.8
6	59	15.7	2.0	16.4	0.7
7	15	15.3	1.7	17.1	1.8
8	36	16.5	2.6	17.6	1.1
9	60	17.2	2.6	18.9	1.7
10	30	16.8	2.8	20.2	3.4
11	24	16.6	2.1	21.3	4.7
12	27	20.6	4.6	21.4	0.8
13	60	19.1	3.7	22.7	3.6
14	24	18.1	3.4	22.8	4.7
15	14	18.9	2.7	23.2	4.3
16	8	21.0	2.1	23.2	2.2
17	6	22.2	2.8	25.0	2.8
Total	372	17.5	3.4		

The BMI of the girls is shown in Table 3. Among all age groups, the observed BMI was lower with comparison to the reference values. The difference for BMI among various age-groups is statistically significant (P <0.001).

Table 3: BMI of girls according to their age and comparison with reference BMI value					
Age (years)	No. of students	MeanBMI value	Standard deviation	ReferenceBMI value	Difference of mean BMI andreference BMI
5	8	15.4	2.0	16.3	0.9
6	51	15.7	2.0	16.6	0.9
7	12	15.3	1.7	17.1	1.8

8	39	16.5	2.6	17.6	1.1
9	45	17.1	2.6	18.9	1.8
10	42	16.8	2.8	20.2	3.4
11	25	16.6	2.1	21.3	4.7
12	23	20.6	4.6	21.4	0.8
13	41	19.1	3.7	22.7	3.6
14	27	18.1	3.4	22.8	4.7
15	19	18.9	2.7	23.2	4.3
16	12	21.0	2.1	23.2	2.2
17	4	22.2	2.8	25.0	2.8
Total	348	17.5	3.3		

As shown in Table 4, the prevalence of underweight among children 5-9 years was (35.4%) and (1.9%) were found to be severely underweight. The prevalence of stunting was 10.0%, including severely stunted children (0.1%). A total of 30.5% children were thin (low BMI forage).

Table 4: Nutritional status among school children as per WHO criteria

Nutritional status	Moderate malnutrition	Severe malnutrition	Total
	n %	n %	n %
Underweight (5-9 years)	51 (32.9)	3 (1.9)	55 (35.4)
Stunting	71 (9.8)	1 (0.1)	72 (10.0)
Thinness	194 (26.9)	26 (3.6)	220 (30.5)

Common morbidities among school children

Pallor (39.1%), myopia (34.8%) and dental caries (14.8%) were the common morbidities observed among children. Some children (4.8%) were having ear wax and tympanic membrane was found ruptured among three students (0.4%). Nine children were having tonsillar enlargement. Skin problems were reported in (2.%) children and 11 (1.5%) children were having unkempt nails (Table 5). The pallor and skin problems were observed more frequently among girls as compared to boys and this difference was statistically significant (Pvalue <0.05).

Table 5: Various morbidities observed among the children (n=720)

Health problem	Boys (n=372)	Girls (n=348)	Total (n=720)	P value
	n (%)	n (%)	n (%)	
Pallor	140 (37.6)	142 (40.8)	282 (39.1)	0.014
Myopia	128 (34.4)	123 (35.3)	251(34.8)	0.063
Dental caries	51 (13.7)	56 (16.09)	107 (14.8)	0.104
Ear wax	20 (5.3)	15 (4.3)	35 (4.8)	0.413
Tympanic membrane perforation	2 (0.5)	1 (0.3)	3 (0.4)	0.211
Tonsillar enlargement	4 (1.1)	5 (1.4)	9 (1.7)	0.079
Skin problems	9 (2.4)	6 (1.7)	15 (2.0)	0.032
Unkempt nails	6 (1.6)	5 (1.4)	11 (1.5)	

Discussion

Malnutrition among children is a common health problem and accounts for more than 50% of all child deaths worldwide[6]. In our study, 59.1% of children in age group of 7-17 years were thin based on BMI. Similar studies done in government schools in Pondicherry[7] and Chennai[8] found that the prevalence of under nutrition was 57.6% and 54.3% respectively. These findings were similar and complemented present study findings. The observed BMI among both sexes and all age-groups inthe present study was lower than reference values for that particular sex and age. Another study done in the same area also observed the similar findings[9].

Most common morbidity observed in present study was pallor (39.1%) and uncorrected myopia (34.8%). Similar findings were observed in a study done in Kolkata[10] where the prevalence of pallor was 39.4% and refractive error was observed among 20.9% of school children. Both these problem are a matter of concern as these would affect the performance of students in school in studies as well as in other activities. Another important finding was 14.8% prevalence of dental carries in children. The other similar studies[7,11] showed prevalence of dental carries as 27.9% and 19.8%. Although present study observed a lower prevalence of dental caries as compared to other studies, still the prevalence is very high and an awareness among the school children and their parents regarding the dental hygiene is required[9].

As this study was limited to school children, the information about the parents was not obtained. The information about parents and their socio-economic status, living conditions and habits is important to find the determinants of under-nutrition and various morbidities among school children.

The various morbidities were prevalent among both sexesand all age groups and most of them were related to poor personal hygiene. So, there is need of including the information on personal hygiene in curriculum from the early classes and sensitization and education of parents is also equally important.

Conclusion

Under nutrition is a prevalent condition among school children at presents. Although, there are special nutritional supplementation programmes to tackle this problem in school children, but there is need to address the other determinants of malnutrition in a holistic way. Health education among parents, community and school teachers are equally important as uncorrected refractive errors among children show the lack of training among teachers to detect such problems. Comprehensive school health programme providing training for peripheral healthworkers and teachers should be planned to address this problem.

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