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## Health and nutritional status of secondary school children in rural Kerala

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### Abstract

**Background & Objectives:** School health is an important branch of community health. School health services is an economical and powerful means of raising community health. Child is vulnerable to many infectious diseases and nutritional deficiencies. The objectives of our study are to assess the health and nutritional status of the school going children.

**Methods:** The present school based cross sectional study was conducted in rural area of Palakkad district, Kerala from November – December 2017. Purposive sampling technique was adopted to select school and 244 students studying in 5<sup>th</sup> to 7<sup>th</sup> standards were included in this study. All students who were present at the time of survey were included in the study. A semi-structured questionnaire was used for collecting data. Data was entered in MS excel, windows 2010 and analysed using MS excel.

**Results:** Out of 244 students who participated in this study, 137 (56.1%), were boys and 107 (43.9%) were girls. The most common health morbidities among the school children was dental caries (27.0%), followed by clinically apparent pallor (5.7%), bleeding gums (7%), ear discharge 1.6%, hypopigmented patches (11.1%) and refractive errors 2.8%.

Thirty seven percent of boys and 25.2% girls were undernourished. The prevalence of overweight was 8% in boys and 6.5% in girls. The prevalence of obesity was 2.2% among boys and 3% among girls.

**Conclusion:** The common health related morbidities found were dental caries, hypopigmented patches, bleeding gums and pallor. Boys were more undernourished compared to girls. Providing health education regarding adequate balanced diet and personal hygiene can reduce the burden of these health-related morbidities among the school children.

**Keywords:** School health, nutrition, health, Kerala

### Introduction

Around 1.2 billion people, or 1 in 6 of the world's population, are adolescents aged 10 to 19. Most are healthy, but there is still substantial premature death, illness, and injury among adolescents. Illnesses can hinder their ability to grow and develop to their full potential. Promoting healthy behaviours during adolescence, and taking steps to better protect young people from health risks are critical for the prevention of health problems in adulthood, and for countries' future health and ability to develop and thrive <sup>[1]</sup>.

Thus, a healthy child becomes a healthy adult and of the various factors which determine the health of the child, nutrition plays the most vital role <sup>[2]</sup>. Being underweight, overweight, or obese during childhood and adolescence is associated with adverse health consequences throughout the life-course. Underweight among children and adolescents is associated with higher risk of infectious diseases, and for girls of childbearing age, is associated with adverse pregnancy outcomes including maternal mortality, delivery complications, preterm birth, and intrauterine growth retardation. Preventing and reversing excess weight in children and adolescents is also important for many reasons; first, weight loss and maintenance after weight loss are hard to achieve, therefore gaining excess weight in childhood and adolescence is likely to lead to lifelong overweight and obesity. Second, being overweight in childhood and adolescence is associated with greater risk and earlier onset of chronic disorders such as type 2 diabetes. Third, childhood and adolescent obesity has adverse psychosocial consequences and lowers educational attainment <sup>[3]</sup>.

As per WHO, an effective school health programme can be one of the most cost-effective investments a nation can make to simultaneously improve education and health of children. WHO promotes school health programmes as a strategic means to prevent important health

risks among youth and to engage the education sector in efforts to change the educational, social, economic and political conditions that affect children [4].

WHO's Global School Health Initiative, launched in 1995, seeks to mobilise and strengthen health promotion and education activities at the local, national, regional and global levels. The initiative is designed to improve the health of students, school personnel, families and other members of the community through schools [5].

The national health policy of government of India, 2012 gives special emphasis to the health challenges of adolescents and long-term potential of investing in their health care. The report also identifies malnutrition, especially micronutrient deficiencies, restricts survival, growth and development of children. It contributes to morbidity and mortality in vulnerable population, resulting in substantial diminution in productive capacity in adulthood and consequent reduction in the nation economic growth and well-being. Thus, the scope of Reproductive and Sexual Health has been expanded to address issues like inadequate calorie intake, nutrition status and psychological problems inter alia linked to misuse of technology, etc [6].

Nutritional anaemia is a major public health problem in India and is primarily due to iron Deficiency [7]. The National Family Health Survey-4 (NFHS-4) data suggests that anaemia is widely prevalent among all age groups, and is particularly high among the most vulnerable – nearly 54 per cent of adolescent girls (15–19 years), 29.1 per cent of adolescent boys are anaemic [8].

Rashtriya Bal Suraksha Karyakram (RBSK) is a new initiative launched in February 2013, by Government of India. It includes provision for Child Health Screening and Early Intervention Services through early detection and management of 4 "D"s, prevalent in children. These are defects at birth, diseases in children, deficiency conditions and development delays including disabilities. The program involves screening of children in the age group 6 to 18 years, in Government and Government aided schools and children in at least once a year for school children to begin with [9].

A growing body of literature has shown that the school health can promote health of students, school personnel, families and other members of the community, but the evidence is limited particularly in resource limited areas.

Though government has launched the RBSK program in 2013, we wanted to evaluate the health status of the school going children in rural area. The overall aim of the study is to assess the health and nutrition status of school children.

**Methodology**

**Study Design**

It was a school based cross sectional study. This study was undertaken as undergraduate research project in the Department of Community Medicine. Taking small research project by the group of students is a part of regular academic curriculum of Kerala University of Health Sciences, Thrissur, Kerala. These students' projects are taken up in clinical posting hours of Community Medicine, in 5<sup>th</sup> Semester. Each student will submit project report to fulfil requirement of practical exams of Community Medicine. Students are expected to defend their project, to get 4 marks in project viva.

**Study Area**

We select a representative sample from (government aided

private school), in Panayoor ward of Vaniyamkulam village, Ottapalam block of Palakkad district.

**Study Population**

Study was done in students enrolled in 6<sup>th</sup> and 7<sup>th</sup> standard. (age group 9 years to 14 years)

**Sample Size**

The sample size was 244. This was based on convenient sampling. Data was collected from 244 students in 3 days during clinical posting hours.

**Study Period**

The data was collected during community medicine clinical posting hours. From November 2017 to November 2018 (including data collection, analysis and report writing).

**Sampling Method**

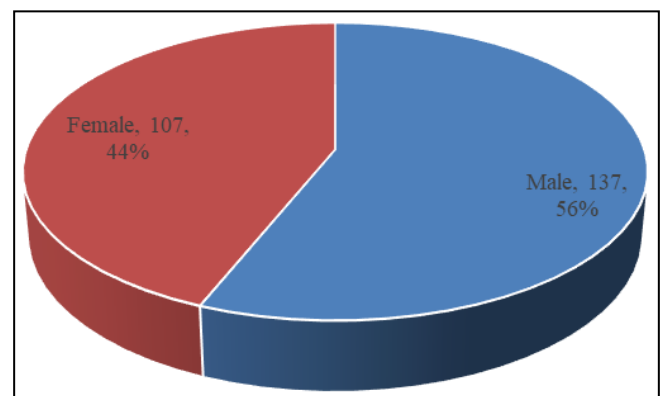
- A convenient random sampling method was used to collect data.
- The data was collected division wise with the help of school teachers, health inspectors, tutors and Assistant Professor of Community Medicine.

**Criteria for nutritional Assessment:**

Height and weight measurements were made following the standard techniques and body mass index (BMI) was computed following inter-nationally accepted standard equation. Nutritional status was evaluated using the World Health Organization (WHO) criteria (2007). We used WHO recommended age and sex specific cut-off points of BMI, which is based on the National Health and Nutrition Examination Survey (NHANES) for school children between 5-19 years [10].

**Cut-offs used are**

1. Overweight: >+1SD (equivalent to BMI 25 kg/m<sup>2</sup> at 19 years)
2. Obesity: >+2SD (equivalent to BMI 30 kg/m<sup>2</sup> at 19 years)
3. Thinness: <-2SD
4. Severe thinness: <-3SD
5. Undernutrition (thinness) was defined as BMI <5<sup>th</sup> percentile as recommended by WHO.



**Fig 1:** Gender of Study Participants

**Statistical Analysis**

Data was entered in excel sheet and analysed using Microsoft excel version windows 10. Simple proportions were calculated using excel sheets.

**Results**

The age distribution of study participant is described in Table no. 1. Only one girl child was 9 years old. Majority (81.1%) of students were between 11 to 12 years. In our study out of 244 students 137 (56%) were male and 107 (44%) were female students (figure no.1).

**Table 1:** Age distribution of study participants

Age (Years)	Boys n (%)	Girls n (%)	Total
9	0 (0)	1 (100)	1
10+	17 (45.9)	20 (54.1)	37
11+	62 (55.4)	50 (44.6)	112
12+	51 (59.3)	35 (40.7)	86
13+	5 (83.3)	1 (16.7)	6
14+	2 (100)	0 (00.)	2
Total	137 (56.1)	107 (43.9)	244

**Health Status of School Children (See Table 2)**

On examination majority (64%) of students were normally

built, 36% were thin in appearance and 0.4% had sick looks. Majority (96%) of students had normal appearance of hair, and few 4% had morbidities like lack of luster, visible nits, dyspigmentation and easily pluckable hair (see figure 1).

Majority (94%) had normal conjunctiva, only 6% had pallor and very few had bitot's spots. Tooth of 61.5% were normal, 11.5% mottled and 27% had dental caries. On examination of gums, 88% were normal, 6.9% showed bleeding gums and 4.5% had spongy gums. On examination of ear, 53% had normal ear, 95% had wax in ear and 1.6% had discharge from ear. Majority 82% had normal skin, followed by 3% with dry and scaly skin, 11% hypopigmented patches, 3% itchy scaly patches and 1% with petechiae rashes and 1.2% had oedema.

The status of vision of students is shown in figure 2. On checking the visual acuity 97% were found to have normal vision, followed by 2% having hypermetropia and 1% myopia.

**Table 2:** Overall health Status of the School Children

General Appearance	No of students (N)	Percentage (%)
Normal Built	156	63.9
Thin Built	87	35.7
Sick Looking	1	0.4
Hair of the students		
Normal	235	96.3
Lack of Luster	6	2.5
Dyspigmentation & Easily Pluckable	1	0.4
Status of Conjunctiva		
Normal	229	93.9
Bitot's Spots	1	0.4
Pallor	14	5.7
Dental status		
Teeth Normal	150	61.5
Mottled	28	11.5
Carries	66	27
Gums		
Normal	216	88.5
Spongy	11	4.5
Bleeding	17	7
Ears		
Normal	130	53.3
Discharge	4	1.6
Wax	110	45.1
Condition of skin		
Normal	202	82.8
Dry and Scaly	8	3.3
Petechiae	1	0.4
Itchy Scaly Patch	8	3.3
Hypopigmented Patches	27	11.1
Hyperpigmented Patches	1	0.4
Oedema of feet		
No Odema	241	98.8
Odema Present	3	1.2

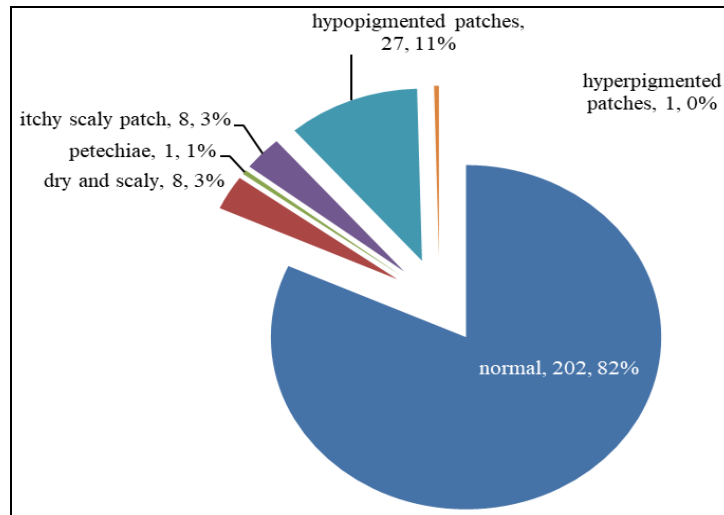


Fig 1: Condition of Skin

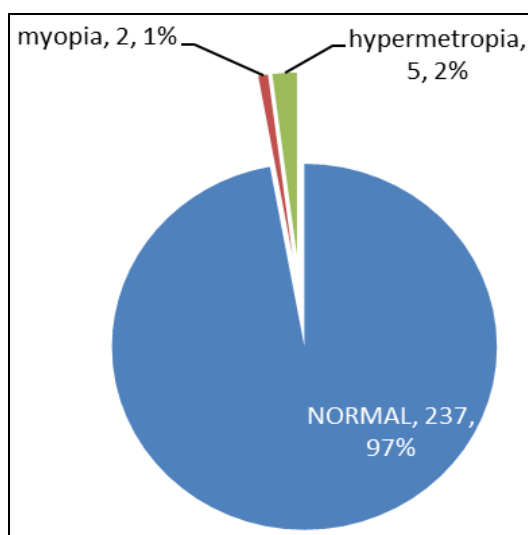


Fig 2: Refractive Status of Eye

**Nutritional Status of School Children**

Table no.3 depicts the nutrition status of boys and girls, based on BMI for age of Boys and Girls (6 to 19 years, WHO Standards). It depicts the actual number of students in each category and the proportion of students in each category. 52.6% of the boys had normal weight and height i.e appropriate for age as per WHO standards. However, the proportion of undernourished were 37.2%. Among those who were undernourished, 19.0% were thin and 18.2% were severely thin. The proportion of overweight and obesity (for their age) among boys was 8% and 2.2% respectively. Majority (65%) of the girls had normal weight and height i.e were normally nourished. However, the proportion of undernourished were 25.2% i.e 15.9% were thin and 9.3% were severely thin. Very few, 6.5% were overweight for their age and 3% were obese.

Table 3: Nutrition status as per BMI for Boys and Girls Number (N) & Proportions (%)

Years	Boys					Total
	-3SD	-2SD	Median ± 1SD	+2 SD	+3SD	
Age	Severe thinness	Thinness	Normal	Overweight	Obesity	Total
	N (%)	N (%)	N (%)	N (%)	N (%)	
10+	3 (17.6%)	0 (0.0)	12 (70.6)	2 (11.76%)	0	17
11+	10 (16.1%)	15 (24.2%)	31(50.0%)	5 (8.06)	1(.61%)	62
12+	11 (21.6%)	9 (17.6%)	25 (49.0%)	4 (7.84%)	2(3.9%)	51
13+	1 (20.0%)		4 (80.0%)			5
14+		2 (100%)	0 (0.0%)			2
Total	25 (18.2)	26 (19.0)	72(52.6)	11(8.0)	3 (2.2)	137
Girls						
Years	-3SD	-2SD	Median ± 1SD	+2 SD	+3SD	Total
Age	Severe thinness N (%)	Thinness N (%)	Normal N (%)	Overweight N (%)	Obesity N (%)	
9+			1(100)			1
10+	0(0.0)	3(15.00)	14(70.0)	2(10.0)	1(5.0)	20
11+	7 (14.0)	7(14.00)	31(62.0)	2(4.0)	3(6.0)	50
12+	3(8.6)	7(20.00)	22(62.9)	3(8.6)	0.00	35
13+	0.00	0.00	1(100)	0.00	0.00	1
Total	10(9.3)	17(15.9)	70(65.4)	7(6.5)	4(3.0)	107

**Discussion**

In our study 52.6% of boys and 70% of girls had normal height and weight for their age. The proportion of undernutrition in boys and girls was 37% and 25%

respectively. The prevalence of obesity was 2.2% among boys and 3% among girls. The prevalence of other health disorder e.g dental carries was 27% and refractive errors was 2.8%.

A study done in Peshawar Pakistan, among 420 school going children (5 to 12-year-old) the prevalence of anaemia was found to be 34.0%. However, there was regional variation in prevalence of anaemia. The percentage was higher in girls (38.9%) than in boys (31.0%). The anaemia percentage was recorded high (55.8%) in lower socioeconomic family children, than middle class (32.2%) and upper class (17%). The percentage of anaemic children was also high (40%) in age group of 10 - 12 years. Pale skin was the most common symptom of anaemia <sup>[11]</sup>.

A study done in urban slums of Punjab Ludhiana reported that about 19 per cent of the children were found to be suffering from severe malnutrition according to Gomez classification. The prevalence of severe malnutrition was 19% in both the sexes in this study and this prevalence is very close to the prevalence of severe undernutrition (18.2%) among boys in our study <sup>[12]</sup>.

A study done by Dambhare DG *et al.* in Maharashtra (2018), had a similar finding. Boys were more stunted than girls. However, the prevalence of other health related parameters like anaemia (28%), dental caries (35.34%), refractive error (13.79%), worm infestation (7.76%) skin problems (6.9%), tonsillitis (2.59%) and wax in the ear (2.59%) was higher than the prevalence in our study <sup>[13]</sup>.

A study done by Navaneethan *et al.* in Tamil Nadu (2011) among 806 school children reported 83% of school children to be underweight, as per WHO's international standards i.e BMI less than 18.5 Kg/M<sup>2</sup>. Only 16% of the students were in the normal range (BMI 18.5 - 24.9), and of the rest, 0.39% and 0.06% were in the BMI range of 25 - 29.9 (overweight) and 30 - 35.9 (obese), respectively <sup>[14]</sup>. In this study, the adult BMI, was used for comparison and we used BMI for age of children (WHO).

A study done in rural Maharashtra among 400 children, found 61 (15.25%) were underweight, 82 (20.5%) were stunted, and 8 (2.0%) were obese. Dental caries was commonest morbidity (55.25%). <sup>[15]</sup> In our study, the prevalence of dental caries was 27%, lower than the study in Maharashtra. However, the prevalence of obesity is similar to our study.

A similar school-based study done in coastal Karnataka, among 773 children documented that Dental caries was the most common illness found in 29.6% of children followed by refractive errors in 10.7% of the children. About 13% were underweight and 2% were overweight for age <sup>[16]</sup>. The prevalence of dental caries and obesity is similar to our study, but the prevalence of undernutrition is high in our study and refractive error is lower in our studies.

A study done by Kulkarni *et al.*, in coastal Karnataka among 797 children reported, dental caries was the most common ailment observed in 31.86% of children, 43.32% of the children were underweight, 53.03% were normal, and 3.65% were overweight for age. The prevalence of obesity is very much similar to our study. Overweight/Obesity among school children is an emerging problem that needs preventive and educational measures regarding nutritional practices to help prevent morbidities in adult life <sup>[17]</sup>.

The study which was done in 11-18-year-old rural school children in Paschim Medinipur district, West Bengal reported prevalence of undernutrition was higher in boys (41.8%) as compared to girls (25.2%) <sup>[18]</sup>. Almost similar to the findings of our study.

A Study done in Srinagar, in 5 to 14 years school going children. The overall prevalence of under nutrition was

19.2%. The prevalence of underweight was lowest in 5-year female (0.0%) and highest (21.5%) in 6-year male <sup>[19]</sup>. The level of undernutrition is the half of what is reported in our study.

The different prevalence of undernutrition and other disorders in the published studies may be due to variation in different age groups involved in the different studies and sample size of studies.

### Conclusions

Boys were more undernourished compared to girls. The common health related morbidities found were dental caries, hypopigmented patches bleeding gums and pallor. The prevalence of obesity was very low among boys and girls.

### Recommendations

1. Providing health education to school children regarding dental care and adequate balanced diet will reduce the burden of preventable diseases.
2. Health education on personal hygiene can also reduce the burden of these health disorders among the school children.
3. The parents should be educated on healthy and low-cost food available locally.
4. Regular intake of healthy food in adequate quantity, will reduce the prevalence of undernutrition among the school children.
5. School health check -up should be done on regular basis, to detect the undernutrition and other problems at the earlier stage.

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