

## Original Research Article

# Prevalence of health problems in suburban schools in Chennai, India

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### ABSTRACT

**Background:** School health programmes help in early detection of health problems but the literature about its effectiveness in India is sparse. Hence, this study was undertaken. The aim of the present study is to measure the weight, height and BMI in school children and to interpret it using the IAP growth charts, to estimate the prevalence of stunting, undernutrition, overweight, obesity, refractory errors, hearing impairment and dental caries in children and to compare the prevalence of above parameters among gender and age.

**Methods:** This is a cross sectional study, conducted between January to March 2017 in 3 suburban schools in Chennai, Tamil Nadu. A total of 631 children in the age group of 6-18 years were screened by an expert team. Weight and height was measured using standard equipments, BMI was calculated and plotted on IAP growth charts. Vision was tested using Snellen chart by an optometrist. Dental evaluation was done by a dentist and hearing screening done by an audiologist using puretone audiometry. Statistical analysis was done using Chi-square test, P value of <0.05 was considered as significant.

**Results:** Out of 631 children, 344 were boys and 287 were girls. 507 children belonged to the primary age group (6-12 years) and 124 children belonged to the secondary age group (12-18 years). The prevalence of stunting was 0.7% and was gradually decreasing with increasing age. The overall prevalence of thinness, overweight and obesity was 10.1%, 1.5% and 7.1% respectively. Underweight was more common among the primary age group whereas obesity was more commonly seen in secondary age group. The prevalence of weight abnormalities in both the age groups and sexes were statistically significant. 19% children had visual defects and the prevalence was more in older children. Dental caries was more commonly seen in primary dentition and the prevalence was 18.9%. Due to lack of ambient conditions, only severe hearing impairment was detected. 5 (0.8%) children had severe hearing impairment.

**Conclusions:** The burden of health problems like malnourishment, refractory errors, dental caries and hearing impairment are high in school children. With the results of the present study, we can conclude that there is a need for implementation of school health screening programmes to detect these health problems at an early stage. To bring a significant change in the community, a dedicated national school health screening program is needed.

**Keywords:** Dental caries, Hearing impairment, Malnutrition, Refractory errors, School health screening

### INTRODUCTION

In a developing country like India, there are many health problems in school children who are the wealth and future of our country, and they require special attention to meet their needs. Children spend most of their time at

school which is not only an ideal place for learning and playing, but also for screening of health problems.

Screening for health problems in children is an important aspect of any community health programme. A school health programme helps in early detection of health

issues and thereby early evaluation and treatment. A number of factors are involved in the development of a child into a promising adult and their health status plays an important role.

School health screening programme aims to identify and address health barriers for learning. Screening includes assessment of nutritional status and screening for common health problems like visual acuity, hearing impairment, dental caries etc.<sup>1</sup>

Developed countries have guidelines and programmes for school health screening. There are no national programmes or guidelines for school health screening in India. Health screening is done in bits and pieces by practitioners, who concentrate more on illness rather than screening for nutritional status, dental caries, hearing and visual problems.

The aim of the present study is to measure the weight, height and BMI in school children and to interpret it using the IAP growth charts, to estimate the prevalence of stunting, undernutrition, overweight, obesity, refractory errors, hearing impairment and dental caries in children and to compare the prevalence of above parameters among gender and age.

## METHODS

This study was a cross sectional study, conducted in three suburban schools in Chennai, Tamil Nadu, India. The study period was between January to March 2017. The study was cleared by the Institutional Ethical Committee of SRM Medical College Hospital and Research Centre. A written and informed consent was obtained from the parents.

A total of 631 school children between 6 to 18 years of age were screened. All the children attending the school during the survey period were included. The screening was conducted by an expert team including a paediatrician, dentist, optometrist, audiologist and trained nurses.

The children were examined for,

- Weight in kilogram
- Height in centimetre
- Body Mass Index (BMI)
- Refractory errors
- Dental caries
- Hearing impairment

Date of birth of the child was taken from the school records. Weight was measured using an electronic weighing machine and height using a stadiometer.

BMI was calculated using the formula, weight in kilogram divided by height in meter square. Height, weight and BMI were plotted on the IAP growth charts.

Visual acuity of the child was measured by an optometrist, using a snellens chart. Dental examination was done by a dentist using a dental examination mirror, explorers and torch. Hearing assessment was done by an audiologist using a pure tone audiometry.

## Reference standards

- Short stature: height below 3<sup>rd</sup> centile for the age and sex
- Tall stature: height >97<sup>th</sup> centile for the age and sex.
- Thinness: BMI below 5<sup>th</sup> centile.
- Overweight: BMI over 23<sup>rd</sup> adult equivalent.
- Obesity: BMI over 27<sup>th</sup> adult equivalent.<sup>2</sup>
- Refractory error: Visual acuity less than 6/9 in a snellen's chart.
- Hearing impairment: Tone not heard at 30dB on 2 out of 3 presentations

Those children for whom abnormalities were detected during the screening, were advised to come to hospital for detailed evaluation and investigations.

## Statistical analysis

Statistical analysis was done using the Chi-square test and p value of <0.05 was considered as significant. A statistical package SSPS version 17.0 was used for analysis.

## RESULTS

Total of 631 children between 1<sup>st</sup> to 12<sup>th</sup> standard were screened. Among this 344 (54.5%) were males and 287 (45.5%) were females. The age group ranged from 6 to 18 years.

Depending on the age group they were classified as primary and secondary. 6-12 years were included in primary age group and 12-18 years in the secondary age group. There were 507 (80.3%) children in primary group and 124 (19.7%) children in secondary group.

## Prevalence of stunting

Among the primary school children, the prevalence of stunting was 0.7% which gradually decreased with increasing age. However, the incidence of stunting was almost similar in both the sex, 0.6% in boys and 0.7% in girls.

## Body Mass Index

The overall prevalence of thinness, overweight and obesity was 10.1%, 1.5% and 7.1% respectively.

The prevalence of underweight was more in the primary school children, whereas obesity was more common among the secondary school children.

The prevalence of weight abnormalities between the age groups was statistically significant (p value= 0.010).

The spectrum of malnourishment, both underweight and obesity was more common among the boys, this was also statistically significant (p value=0.002).

**Table 1: Height parameters in school children.**

Age group	Height			P value
	Normal	Short	Tall	
Primary age group (6-12 years) N=507	502 (99.1%)	4 (0.7%)	1 (0.2%)	0.540
Secondary age group (12-18 years) N=124	124 (100%)	0	0	
Gender	Normal	Short	Tall	0.398
Male (N=344)	341 (99.1%)	2 (0.6%)	1 (0.3%)	
Female (N=287)	285 (99.3%)	2 (0.7%)	0 (0%)	

**Table 2: BMI in school children.**

Age group	BMI				P value
	Normal	Underweight	Overweight	Obesity	
Primary age group (6-12 years) N = 507	415 (81.8%)	57 (11.3%)	6 (1.2%)	29 (5.7%)	0.010
Secondary age group (12-18 years) N=124	98 (79.1%)	7 (5.6%)	3 (2.4%)	16 (12.9%)	
Gender	Normal	Underweight	Overweight	Obesity	0.002
Male (N = 344)	269 (78.1%)	38 (11.4%)	2 (0.5%)	35 (10%)	
Female (N = 287)	244 (85%)	26 (9.3%)	7 (2.3%)	10 (3.4%)	

**Refractory errors**

120 (19%) children had visual defects on Snellen’s chart. Among these 34 were already on spectacles. 86 children had undetected refractory error.

The incidence of refractory errors was more in the older children, which was statistically significant when compared to the younger age group (p value=0.016).

**Table 3: Prevalence of refractory errors among school children.**

Age group	Visual acuity		P value
	Absent	Present	
Primary age group (6-12 years) N = 507	420 (82.9%)	87 (17.1%)	0.016
Secondary age group (12-18 years) N = 124	91 (73.4%)	33 (26.6%)	
Gender	Absent	Present	0.906
Male (N = 344)	278 (80.8%)	66 (19.2%)	
Female (N = 287)	233 (81%)	54 (19%)	

**Dental caries**

Overall prevalence of dental caries was 18.9%. Out of 507 children in the primary age group, a total of 107 (21.1%) had dental caries and 12 (9.7%) children out of 124 children in the secondary age group had dental caries.

This was statistically significant (p value = 0.004). The prevalence between both the sexes was almost similar, and was statistically insignificant.

**Table 4: Prevalence of dental caries among school children.**

Age group	Dental caries		P value
	Yes	No	
Primary age group (6-12 years) N=507	107 (21.1%)	400 (78.9%)	0.004
Secondary age group (12-18 years) N=124	12 (9.7%)	112 (90.3%)	
Gender	Yes	No	0.160
Male N = 344	58 (17%)	286 (83%)	
Female N = 287	61 (21.3%)	226 (78.7%)	

**Table 5: Prevalence of hearing impairment among school children.**

Age group	Hearing impairment		P value
	Absent	Present	
Primary age group (6-12 years) N = 507	504 (99%)	3 (1%)	0.255
Secondary age group (12-18 years) N = 124	122 (98%)	2 (2%)	
Gender	Absent	Present	0.048
Male N=344	339 (98.5%)	5 (1.5%)	
Female N=287	287 (100%)	0	

### **Hearing impairment**

Among 631 children, 5 (0.8%) children could not hear frequencies presented at 30 dB, hence diagnosed to have severe hearing impairment.

### **DISCUSSION**

School health screening programme is the best and easiest way to detect common health problems in children. These health problems may interfere with student's education; hence screening should be carried out by an expert and appropriate referral should be made if necessary.

Anthropometric data are widely used to assess the nutritional status of children. Height and weight of children vary according to the ethnicity and cultural background. Hence, centile charts are developed to represent height and weight in standard format. Centile charts represent the average population of children from certain areas. Once such chart is the IAP growth charts.

In our study, IAP growth charts were used for plotting the height and weight. In a study by Aroor AA et al, on school going children in Karnataka, the prevalence of stunting was 3%, which is much higher than the present study.<sup>1</sup>

BMI is used to estimate a person's risk for weight related problems and it correlates with the body fat. Obesity in Indian children has become a major health problem. Vohra et al, reported the prevalence of underweight, overweight and obesity as 60.44%, 4.17% and 0.73% respectively.<sup>3</sup> In a study by Bharati et al, the prevalence of overweight and obesity was 3.1% and 1.2% respectively.<sup>4</sup> In present study, there was a significant increase in the prevalence of obesity in boys in adolescent age group. The lack of adequate play time, exercise, eating junk food and academic stress plays a role in the higher prevalence of obesity in adolescents.

Refractive error is a common eye disorder in school going children. In a study by Ashish et al, refractive error was seen in 7.28%.<sup>5</sup> Aroor AA et al, reported 16% incidence of refractory error in children which was comparable with 19% in the present study.<sup>1</sup> In the present study, higher prevalence of refractory error was noted in the older children, may be due to undetected refractory errors since early childhood which kept adding up.

There are many dental problems that affect school aged children of which carries tooth is the most common. 18.9% children had dental caries in the present study and 22.9% in a study by Rao A et al.<sup>1</sup> In the present study the prevalence was higher in primary school children. Dental caries was more prevalent in primary dentition, got better with secondary dentition. This is probably due to bottle feeding and poor oral hygiene.

According to the study by Jacob A et al, and Chundathodi A et al, 11.9% and 6.1% children were detected to have hearing impairment respectively.<sup>8,9</sup> In the present study 0.8% children were detected to have severe hearing loss. Due to lack of ambient condition for hearing assessment, we had to screen children with 30dB for frequencies 1000Hz, 2000Hz and 4000Hz. Hence, we were able to screen for only severe hearing loss and limited the detection of mild to moderate hearing loss. A silent room like a library away from the school classrooms is ideal place for hearing screening in school health programmes.

### **CONCLUSION**

Currently the burden of health problems like malnourishment, refractory errors, dental caries and hearing impairment are high in school children. These health problems are usually left undetected. Visits to paediatric practitioners, hospitals or clinics, during acute illness is not enough to identify these health issues.

With the results of the present study, we can conclude that there is a need for implementation of school health screening programmes to detect these health problems at an early stage. To bring a significant change in the community, a dedicated National School Health Screening Program is the need of the hour. Support from the school with regards to infrastructure and volunteers, awareness among parents and teachers, and funding from parents and the government go a long way in successful implementation of National School Health Screening programmes.

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