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Original Research Article

Cross sectional study on nutritional status of children in government and private schools of Madhya Pradesh

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Abstract

Introduction: Growth factor and hormonal growth spurt are additive factors to be considered for growth, along with availability of food and type of food, which is major cause beyond the hidden genetic factors. Various multi-centric studies were conducted to develop the growth charts, few of them were extremely appreciating as ICMR, still faced many controversies. One of the major setbacks faced were urban and rural growth study of children, featuring urgent requirement of growth charts for every nation.
Objectives: To assess and compare the anthropometric nutritional assessment (height, weight, BMI, mid arm circumference) of government and private high school children.
Methods: The study is a cross sectional study, in which students of (age 11-18 years) class VI-X of government school (n= 104) and private school (n=151) were taken for assessing height, weight, mid arm circumference and BMI. Data was entered on MS Excel sheets and unpaired‘t’ test was applied. P value of < 0.05 was considered significant.
Results: Unpaired t test results revealed no significant difference in the anthropometric indices, except for in 9th standard where significant difference was found in height, weight, MAC and BMI and the magnitude was greater in private than in government. MAC of 8th standard was also found higher in private school and significant difference was appreciated.
Conclusion: There is an urgent need for developing and integrating a nutritional assessment screening program for high school children in terms of anthropometric measurement to counter and prevent the malnutrition. This will in turn develop reference growth charts for the nation.

Keywords: Anthropometry, growth charts, nutrition status, school health

Introduction

Primary school age is a dynamic period of physical growth and mental development that leaves behind its deficiency marks even in adolescence. Research indicates that these nutritional deficiencies lead to poor health and are a cause for low school enrollment, high rate of absenteeism, school drop outs and low-class performance[1].Prevalence of malnutrition in India is 42% according to NFHS-4 data[2].Measurement of height and weight of children in centiles are used as principal criteria in assuming the adequacy of nutrition[3].Though genetically determined, growth factor and hormonal growth spurt are additive factors for growth of children along with availability of food and type of food that plays a major role[4].Various studies on growth charts for U.S.[5, 6]have been published till date. Weight reference charts for breastfed infants and bottle-fed infants have been developed for the British[6] and also Swedish population[7].

Various multi-centric studies were conducted to develop the growth charts even in India but till date we have not received standardized growth charts for our Indian children who are succumbed to varied environmental conditions[8].Work has been done in India by ICMR[9]which is still not preferred due to certain shortcomings related to large rural population under study, featuring urgent requirement of growth charts for every nation. The growth charts for every nation must be reviewed from time to time. Beyond this, very few comparative studies have been conducted between government and private schools[10-11]and our study being one of them.

Objectives

To assess and compare the anthropometric nutritional assessment (Height, Weight, BMI, Mid arm circumference) of government and private high school children.

Materials and Methods

This is a school based cross sectional study conducted in the month of October-November 2017 in a government school and private school in an urban area of Indore city of Madhya Pradesh, India. All the students enrolled from VI to X in the government school (n=104) were present on the day of examination. All the students of VI-X std. (age 11-18 yrs.) were selected for the study where age was calculated by date of birth obtained from school register. Being 100% attendance all students (n=104) were taken for the study. In the private school keeping similar criteria for age and standard of education, 200 students were enrolled, while 157 were present on the day of data collection, so study sample was restricted to 157.

Physical examination was done by standardized measurement for height, weight and mid arm circumference (MAC) of children. Body weight was measured by standard weighing machine nearest recording as 0.5 kg, stadiometer was placed in school corridors with nearest recording 0.1 cm. MAC was measured by measuring tape with cross method to avoid error, while measuring, nearest to 0.1 cm was recorded. All the instruments were pre-calibrated and pre-tested for their least count in pilot study and same measuring instruments were used in both the schools.

After explaining the study and the methodology of the present study permission was granted by the principle, chairman of the school and the trustee of the private school, informed consent was obtained from the parents a day before in the form of written consent and those who failed to give written consent were telephonically accessed and consent was obtained. The data collected was also shared with both the schools in separate sheets. The help rendered by the principals of the schools and the cooperation of the NGO received during the survey was of immense help. The survey was followed by a nukkad natak performed at the school to

aid in health education for nutrition. Data was entered on MS Excel sheets, BMI was calculated and unpaired't' test was applied using IBM SPSS software (version 22). P value of less than 0.05 was considered significant.

Results

The result was sent to the schools in percentage and centiles where in majority of the boys in height, weight, MAC were lying below 25th centiles and 50th centiles according to who growth charts. Where below 50th centile data were reported as malnourished and this was 89% in private 93% in government.

Table 1: Comparing Nutritional Status of Boys of Government and Private Schools

Std. / Grade	Govt./ Private (No.)	Height (in cm)			Weight (in kg)			Body Mass Index (BMI)(Wt. in kg/Ht. in mt^2)			Mid Arm Circumference (MAC)(in cm)		
		Mean	SD	p-value	Mean	SD	p-value	Mean	SD	p-value	Mean	SD	p-value
10th	Govt. (26)	162.8	2.6	0.08	48.2	8.7	0.431	18.0	2.0	0.94	23.2	1.07	0.56
	Private (22)	164.1	3.4		48.8	8.4		18.0	2.7		23.6	1.3	
9th	Govt. (25)	155.2	1.7	0.0001*	41.4	5.7	0.0013*	18.2	3.1	0.22	21.1	0.6	0.0008*
	Private (22)	164.08	2.9		49.0	8.3		17.3	1.9		24.4	1.3	
8th	Govt. (5)	157.2	1.8	0.95	39.1	4.09	0.053	18.3	3.3	0.12	20.5	1.3	0.03*
	Private (17)	156.97	3.3		45.4	6.3		15.7	1.3		23.2	0.7	
7th	Govt. (4)	152.5	1.8	0.21	42.5	7.4	0.058	16.1	2.4	0.07	21.2	0.8	0.41
	Private (17)	148.05	2.5		35.2	6.2		19.1	2.9		20.19	0.9	
6th	Govt. (13)	142.63	2.29	0.86	30.8	4.3	0.53	16.4	3.4	0.22	19.02	0.5	0.36
	Private (24)	142.24	2.74		32.3	7.7		15.1	1.12		19.8	1.24	

[*Found significant at p value < 0.5]

As seen from Table 1 that unpaired t test results among boys of government and private schools that revealed no significant difference in the anthropometric indices, except for in 9th standard where significant difference was found in height, weight, MAC and BMI, also in MAC of 8th standard while no significant difference was found in the students of tenth standard. This can be due to attributed to growth spurt in the adolescent which is met with appropriate nutrition at the same time that had caused a visible change in growth parameters. The difference was not found to be significant in tenth standard owing to elderly group admissions in higher number in government schools.

Table 2: Comparing Nutritional Status of Girls of Government and Private Schools

Std./Grade	Govt./Private (No.)	Height(in cm)			Weight(in kg)			Body Mass Index (BMI)(Wt. in kg/Ht. in mt^2)			Mid Arm Circumference (MAC)(in cm)		
		Mean	SD	p-value	Mean	SD	p-value	Mean	SD	p-value	Mean	SD	p-value
10th	Govt. (4)	154.9	1.5	0.83	43.5	5.5	0.62	18.2	2.7	0.79	23.0	0.8	0.86
	Private (10)	156.0	3.4		44.3	8.7		18.7	2.3		23.2	1.0	

9th	Govt. (10)	146.3	1.3	0.76	38.7	5.7	0.29	15.9	2.5	0.07	21.9	0.8	0.93
	Private (10)	148.9	3.1		38.9	9.5		18.6	1.5		21.8	1.12	
8th	Govt. (8)	146.1	2.0	0.45	35.5	7.0	0.65	17.1	2.2	0.45	18.9	0.5	0.02
	Private (9)	149.0	2.0		36.8	5.4		16.3	2.6		21.0	0.7	
7th	Govt. (5)	139.7	0.7	0.27	29.1	1.2	0.87	15.4	1.6	0.50	17.4	0.4	0.10
	Private (11)	137.8	1.3		28.8	3.7		14.9	0.7		19.9	1.2	
6th	Govt. (4)	135.2	0.5	0.92	34.0	2.4	0.24	15.9	2.5	0.07	20.3	0.4	0.44
	Private (10)	136.6	3.0		29.3	6.9		18.6	1.5		19.2	1.0	

It was seen from Table 2 that unpaired test results among girls of government and private schools. The data in the table reveals that in seventh standard the mean weight of the girls in government and private schools were 29.1 kg and 28.8 kg which was below those found in sixth and eighth standard. On comparing the means by t test all the growth parameters were found to be reduced in seventh and eighth standard showing chronic malnutrition prevalent among all the girls irrespective of type of school. This was found due to growth spurt and increased demand unmet with adequate nutrition and worsened with advent of menarche and undue prevalence of anemia since birth.

Discussion

In the present study, we did not find any significant difference in BMI and the BMI of girls and boys has been found comparable which is contradictory to the findings of study by ICMR[9],In the Pakistani pediatrics population a study of Sina Aziz *et al*.[12]revealed the values lying at P5, P25, P50 percentiles and one value at P95 similar to data found in my study with the exception of P95. Akram *et al*.[13],did a longitudinal study to determine anthropometric measurements in Pakistani children from a high socio-economic back-ground and their results indicated weight and length curves of the study group duplicating NCHS standards at all centiles. Ogden *et al*.[5]present a clinical version of the 2000 CDC growth charts and give a comparison with the previous version, the 1977 NCHS growth charts. It is important that the growth of children from South and East Asian populations be rigorously assessed in the process of developing the new international growth references[14].

There is a need for ethnic specific growth charts and Body Mass Index (BMI) cut-off points for underweight, overweight and obesity in children. Similar finding was observed by Deurenberg *et al*.[10],where a comparison in the relationship between BMI and body fat of children aged 7-12 years from Singapore, Netherlands and Beijing was done. This study strongly suggested that relationship between (BF %) Body for percentage and BMI is different among children of different background. Results of z scores for weight-for-age (zwfa), height-for-age (zhfa) and BMI-for-age (zbfa) indicate that boys fall in the overweight category with shorter height (SD >1<2) in all age groups except at age group 8 where the boys are significantly taller than reference values. In case of girls, zwfa and zbfa indicate that girls are overweight in all age groups (SD >1<2) except at age 6 and zhfa scores reflect that they are shorter than the reference values across all age groups[9].Mean height and weight of boys and girls were higher than ICMR standards in both type of school[9].The mean mid arm circumference of all girls and boys from both type of schools had higher value than the ICMR standards[9].

The overall prevalent rates of underweight, wasting and stunting were 61.2, 16.8 and 27.6%, respectively. In the rural area these were 70.5, 17.8 and 35.8%, while in the urban they were 52.2, 15.9 and 19.8%, respectively. The mean nutritional indices (Weight for Age, Weight for Height and Height for Age) were found to be significantly lower among the rural pupils than urban pupils (p<0.001 in each case)[15-17].Study done by Onis *et al*.[18]compared the mean BMI-for-age of adolescent boys from Calcutta with French, Dutch, British and NCHS reference medians in which children from Calcutta plotted well below the other groups

including NCHS standard. This and similar studies[10-11]as mentioned above supports our work. Growth standards developed in industrialized countries may be appropriate for measuring child growth only of the privileged groups in developing countries[12, 16, 18].Though WHO global data is available[20], updated, growth reference charts are essential for every country[5], thereby decreasing the lead time of diagnosis and reducing future sufferings and child mortality[21].

Limitations

The sample size taken is not sufficient enough to generalize the result to the whole state and country, this study can be start as a drop for the future studies which in collaboration can give the result as national growth charts.Once these growth charts are made they can be further amended every year.

Conclusion

In this study, it is evident that majority of children face malnutrition problem in their growing age in India. There is an urgent need for developing and integrating a nutritional assessment screening program for high school children in terms of anthropometric measurement to counter and prevent the malnutrition. In spite of mid-day meal scheme, the problem of inadequacy in nutrition regarding mid-day meals have come up henceforth there are various differences in anthropometric measurements in children of different nations. These impending deficiencies in micronutrients and macronutrients is not only responsible for malnutrition but also may lead to glucose impaired metabolism and diabetes. So, there is an urgent need for developing reference growth charts for both urban and rural sectors of India on a mass scale.

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Conflict of interest: No conflict of interest.

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