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Original Research Article

A study on prevalence of overweight and obesity amongst school children of Bangalore

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ABSTRACT

Background: As such, obesity and overweight have both been described as anomalous accumulation of excessive body fat which may be harmful to health. Obesity is one of the most prominent problems imminent among all societies, particularly in developing countries. Often these conditions lead to complications such as hypertension, diabetes, cardiovascular diseases and if not treated timely, death. The objective of the study was to assess the prevalence of overweight and obesity amongst school children of Bangalore and to study the association of age and gender with overweight and obesity amongst school children of Bangalore.
Methods: School based cross sectional study was conducted at B.G.S International school, from August to December 2017. Students aged 6 to 16, who were present during the survey, were included in the study.
Results: Overall, the prevalence of overweight and obesity among the students were 7.09% and 4.08%. The prevalence of overweight and obesity amongst boys were 3.19% and 2.04%. The prevalence of overweight and obesity amongst girls were 3.90% and 2.04%.
Conclusions: Integrating physical activity and nutrition education in school curriculum at all levels will play a great part in decreasing the prevalence of obesity and overweight.

Keywords: Obesity, Overweight, School children, Physical activity

INTRODUCTION

With the advent of modernity, obesity is a global epidemic and is an important risk factor for developing cardiovascular diseases (CVD), including diabetes, hypertension and dyslipidemia.[1] As such, obesity and overweight have both been described as anomalous accumulation of excessive body fat which may be harmful to health. Obesity is one of the most prominent problems imminent among all societies, particularly in developing countries. Although this problem is observed in developing countries, it is more serious in industrialized urban dwellings, which has been attributed primarily to adopting a modern lifestyle with less physical activity and excessive consumption of energy dense foods.[2]

Prevalence of obesity is increasing rapidly across the country over the last 3 decades, and this trend will continue not only in developed countries, but also in developing countries.[3] According to the data retrieved in 2015 the prevalence of obesity in children was estimated to be 68 million, among which 47 million were located in developing countries. Globally, an estimated 10 per cent of school-aged children between 5 and 17 years of age are overweight or obese. Currently the prevalence of obese school children is 20% in U K and Australia, 15.8% in Saudi Arabia, 15.6% in Thailand, 10% in Japan and 7.8% in Iran. Also, WHO reported in the latest report

that obesity, is among the 5 causes of death in the world. According to the WHO report, at least 2.8 million deaths occur in adults due to obesity and overweight.[4,5]

The contributing factors for obesity and overweight are attributed to obesogenic environments where people are frequently exposed to and consume savoury foods with hidden fats and sugars that can impair metabolism and lead to obesity.[6] Also it is proved that there is significant association of obesity and overweight with socio-economic status, urban lifestyle, family size, physical inactivity, educational status, cultural factors, and poor eating habits.[7,8] For instance, as compared to rural areas, people in urban areas have higher obesity rate, possibly due to consumption of high-fat diets and more sedentary lifestyles. For daily living, the amount of energy spent has also reduced over the years, which also promotes obesity. Obesity is also often associated with high socio-economic status; as populations in the developed world are mostly affected by obesity.[9]

Aims and objectives

- To study the prevalence of overweight and obesity amongst school children of Bangalore.
- To study the association of age and gender with overweight and obesity amongst school children of Bangalore.

Operational definitions

Over weight and obesity

Overweight and obesity are defined as abnormal or excessive fat accumulation that may impair health.

Body mass index

Body mass index (BMI) is a simple index of weight-for-height that is commonly used to classify overweight and obesity in adults. It is defined as a person's weight in kilograms divided by the square of his height in meters (kg/m^2).

Adults

For adults, WHO defines overweight and obesity as follows

- Overweight is a BMI greater than or equal to 25; and
- Obesity is a BMI greater than or equal to 30.

Children under 5 years of age

- Overweight is weight-for-height greater than 2 standard deviations above WHO child growth standards median; and
- Obesity is weight-for-height greater than 3 standard deviations above the WHO child growth standards median.

Children aged between 5–19 years

- Overweight is BMI-for-age greater than 1 standard deviation above the WHO growth reference median; and
- Obesity is greater than 2 standard deviations above the WHO growth reference median.

METHODS

School based cross sectional study was conducted at B.G.S International school, Devanhalli, Bangalore, from August to December 2017 with the prior permission of the principal.

Students aged 6 to 16, who were present during the survey, were included in the study.

Written informed consent was obtained prior to the start of the study. Students, who were sick or denied permission to be included in the study, were excluded.

Ethical clearance was obtained from the institutional ethical committee of Akash Institute of Medical Sciences and Research Centre.

General physical examination with Height and weight were measured using standardized protocols. Each Child's height in centimetres and weight in kilograms were measured by adopting standard procedure.

Height was determined by the use of length board. Participants were asked to remove the shoes and step in front of the height board placed on a flat floor, with heels, buttocks, shoulders and back of the head touching the wall. While the head was comfortably erect with the lower boarder of the orbit in the horizontal plane and external auditory meatus and the arms hanging by, at the sides in a natural manner. The height was then measured and recorded to the nearest 0.1 cm. Weight was determined by using a digital weighing scale. Participants were asked to remove shoes and step on a zeroed digital weighing scale. The weight was then measured and recorded to the nearest 0.1 kg. Body mass index (BMI) was calculated using BMI charts based on NCHS (National Centre for Health Statistics), CDC USA (United States of America) standards.[10]

Data was entered in excel sheet and analysis with SPSS software (Version 24). Descriptive statistics were used. to examine anthropometric characteristics. Chi- square test was used where necessary.

RESULTS

A total of 1127 students had taken part in the study. Out of them 55% were boys and 45 % were girls. The overall mean age was 10.08±2.557 and for boys it was 10.17±72.6 and for girls.

Table 1: Cut off point of BMI.

Gender	Girls		Boys	
Age (years)	Over weight	Obese	Over weight	Obese
6	17-18.8	>18.8	17-18.4	>18.4
7	17.6-19.6	>19.6	17.4-19.2	>19.2
8	18.3-20.6	>20.6	18-20	>20
9	19.1-21.8	>21.8	18.6-21	>21
10	20-23	>23	19.4-22	>22
11	20.8-24	>24	20.2-23.2	>23.2
12	21.7-25.2	>25.2	21-24.2	>24.2
13	22.5-26.2	>26.2	21.8-25.1	>25.1
14	23.3-27.2	>27.2	22.6-26	>26
15	24-28	>28	23.4-26.8	>26.8
16	24.6-28.8	>28.8	24.2-27.5	>27.5

Table 2: Socio demographic table.

		Boys (%)	Girls (%)
Age	6-10	393 (63)	322 (64)
	11-16	227 (37)	185 (36)
Class	Primary (1-4th std)	307 (50)	265 (52)
	Middle (4th-7th std)	213 (34)	157 (31)
	High (8th-10th std)	100 (16)	85 (17)

From the Table 2, it can be found that, 63% of the boys were in the age group of (6-10), and 37% were in the age group of (11-16). Likewise, 64% of girls were in the age group of (6-60) and 36% were in the age group of (11-16). The table also depicts 50% and 52% of the boys and girls respectively were in primary school and 34% and 31% of boys and girls were in middle school.

Overall, the prevalence of overweight and obesity among the students were 7.09% and 4.08%.

Table 3: Prevalence of overweight and obesity amongst the students.

	Total number	Overweight (%)	Obesity (%)
Boys	627	36 (3.19)	23 (2.04)
Girls	507	44 (3.90)	23 (2.04)
Total	1127	80 (7.09)	46 (4.08)

The prevalence of overweight and obesity amongst boys were 3.19% and 2.04%. The prevalence of overweight and obesity amongst girls were 3.90% and 2.04%.

When tabulated against age, it was found that 2.5% of the children between 6 to 10 years of age were obese and 5.5 % were overweight. Also, 6.8% and 10% of the children between 11 to 16 years were found to obese and overweight respectively (Table 4).

It was also found that prevalence of overweight and obesity, when tabulated against age, it was significantly associated.

From the Table 5, it can be seen that 3.7% of boys were obese and 5.8% were found to be overweight. Likewise when tabulated against the girls, it was found that 4.5% and 8.7% were obese and overweight respectively.

When these variables were tabulated for chi-square test, it was found that there was no significant association between overweight and obesity against gender.

Table 4: Prevalence of obesity and overweight according to age.

		BMI			Chi square	P value
		Obese (%)	Over weight (%)	Normal (%)		
Age (in years)	6-10	18 (2.5)	39 (5.5)	658 (92)	21.43	<0.001
	11-16	28 (6.8)	41 (10)	343 (83.3)		

Table 5: Prevalence of obesity and overweight according to gender.

		BMI			Chi square	P value
		Obese (%)	Over weight (%)	Normal (%)		
Gender	Boys	23 (3.7)	36 (5.8)	561 (90.5)	4.13	0.126 (not significant)
	Girls	23 (4.5)	44 (8.7)	440 (86.8)		

DISCUSSION

The study investigated the prevalence of overweight and obesity among school children aged 6 to 16 years in Devanahalli using BMI.

This is the first study to be carried out in the present area, which falls under rural region of Bengaluru city. In the present study, the overall prevalence of obesity among children aging from 6 to 16 years was 4.08%, while the overall prevalence of overweight was 7.09%. This

finding was concurrent with the study done by Goyal et al which reported the overall prevalence of obesity and overweight to be 6.55% and 13.9% in their study conducted in Surat city.[8] Also, a study done by Ramachandra et al showed that, the prevalence of overweight was higher than the prevalence of obesity in their study on adolescents.[2]

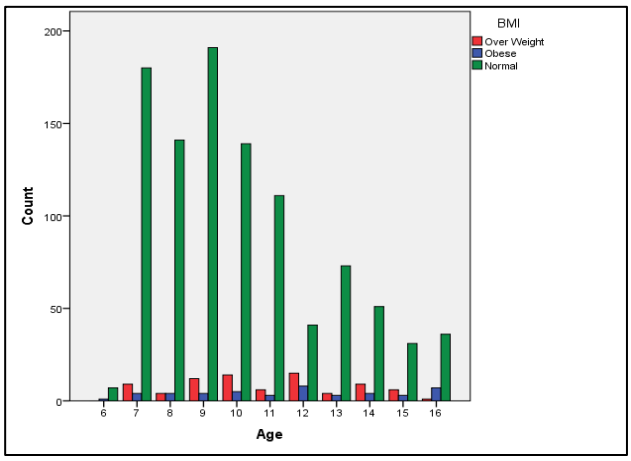

Figure 1: Age vs. BMI.

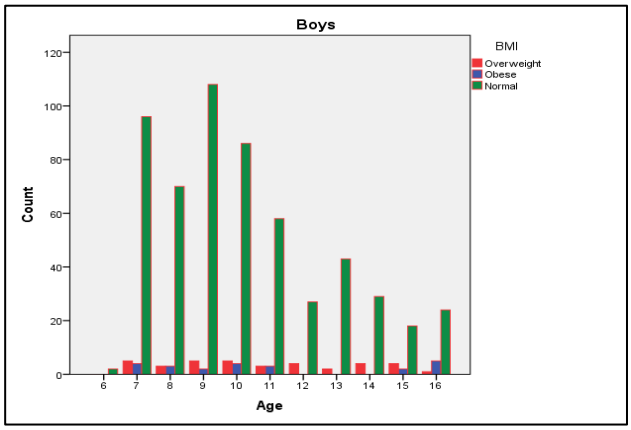

Figure 2: Gender (boys) vs. BMI.

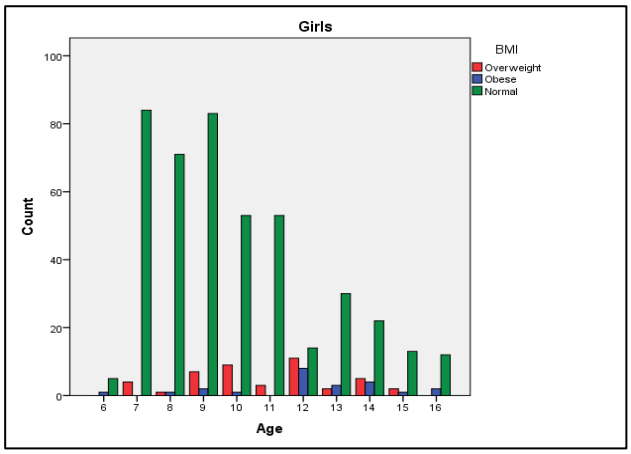

Figure 3: Gender (girls) vs. BMI.

We also found that, in the current study, the rate of obesity and overweight were higher in girls than boys. A study done by Mudur in three major Indian cities found that more girls were overweight than boys.[11] On the contrary studies by Kapil et al also indicated that the prevalence of obesity was lower in girls (6%) as compared to boys (8%).[5] Also, a study done by Goyal et al depicted that the prevalence of obesity and overweight was 6.7% and 15.1% in boys and 6.4% and 13.3% in girls.[8] All these studies therefore indicate that the sex of the child has an influence on the prevalence of overweight and obesity.[12]

Significant statistical association was found between overweight and obesity when tabulated against gender; however there was no statistical association between gender and obesity or overweight. This finding was similar to study done by Laxmaiah et al.[14]

Even though this study did not look at socioeconomic status, smoking, dietary factors, loneliness, behavioural patterns, age of menarche, and order of births of the students and how these factors might have an may influence on their different weight statuses, it is reasonable from other studies to derive say that a complex interplay of these factors could have contributed to our findings in this study.[13]

An important finding of this study is an ever burgeoning prevalence of obesity among the school going children when compared to previous survey in India. This study has shown higher figures which is suggestive of the obesity epidemic in 21st century.[15,16]

WHO recommends broad, comprehensive and coordinated public health efforts at national, regional and local levels including initiatives that reduce unhealthy eating and physical inactivity, and raise awareness around the relationship of diet and physical activities on health and life style. These strategies must be evidence-based, multisectoral, multidisciplinary and focused on life course perspectives.[17]

CONCLUSION

The study revealed a high prevalence of overweight when compared to obesity among the students. Therefore, there is a need to establish effective prevention and health promotion programmes among the students.

To reduce the future health problems, children and adolescents should be encouraged to participate in physical activity as recommended; this should be simple and enjoyable, so that all the children and adolescents will participate actively. Integrating physical activity and nutrition education in school curriculum at all levels will play a great part in decreasing the prevalence of obesity and overweight. This would enable maintaining healthy weights and avoiding the possible immediate and long-

term health complications associated with overweight and obesity.

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