

Study of prevalence of overweight and obesity among high school children of Davangere city

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Abstract

Background: The problem of obesity is confined not only to adults but also among the children and adolescents of developed as well as developing countries. It is shown that 50-80% of obese children will continue as obese adults. Obesity predisposing to diabetes, hypertension, cardiovascular diseases, cancer and many more life shortening problems is well recognized. The present study was undertaken to understand the prevalence trend and influencing factors of childhood obesity

Aim: To estimate the prevalence of overweight and obesity among high school children aged between 13 to 16 years of Davangere City and to identify the factors influencing overweight and obesity.

Methods: This was a cross sectional study conducted in Davangere city, Karnataka, India. The selected high school (VIII-X) children aged 13 to 16 years (Govt., Aided and Unaided) proportion to the population size of the students constituted the study population. Sample size was 923 by simple random sampling method.

Results: Prevalence of childhood overweight and obesity was 7.6%. Parents education, income and parental obesity had an impact on childhood obesity. Increased snacking habits and sedentary activity like watching TV/ playing computer were the influencing factors of childhood obesity in this study.

Conclusion: On the background of higher prevalence of obesity in school children formulation and implementation of intervention (short and long term) measures focusing mainly on increasing the activity of children, drawing them away from high energy foods and providing psychological support is recommended

Key words: High school children; Childhood obesity; Influencing factors; parental obesity; Snacking habit

Introduction

There is an alarming increase in prevalence of obesity worldwide with globalization of economics and rapid international communication these non-communicable diseases have behaved like communicable diseases. The problem of obesity is confined not only to adults but also among the children and adolescents of developed as well as developing countries.

The International Obesity Task Force (IOTF) has calculated the 10% global prevalence of obesity in children of 5–17 years^[1]. India has high potential for the problem of childhood obesity and will be among the top four economic countries by 2020. Scientists have shown that 50-80% of obese children will continue as obese adults^[2]. Obesity predisposes to diabetes, hypertension, cardiovascular diseases,

cancer and these problems will be worse if obesity begins in childhood^[3]. Invariably obesity is a product of imbalance between energy intake and energy output. Several factors such as overeating, psychological factors, sedentary lifestyle and genetic predisposition trigger this energy imbalance^[4]. WHO has also emphasized the urgent need of understanding the prevalence trend and influencing factors of childhood obesity^[3] to halt the emerging epidemic of childhood obesity.

Objectives:

1. To estimate the prevalence of overweight and obesity among high school children aged between 13 to 16 years of Davangere City.
2. To identify the factors influencing overweight and obesity.

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Materials and methods

The study was conducted on high school students of Davangere city. During that year there were 79 high schools in the city, in which 10% of the schools were selected i.e., 8 schools by systematic random sampling, it was allocated to 3 types of schools (Govt., Aided and Unaided) proportion to the population size of the students. Selected high school (VIII – X) children aged 13 to 16 years constituted the study population.

The previous studies have shown that the prevalence of overweight in adolescence as 12 to 15%. Considering 12% of the prevalence, sample size was determined as follows:

$$n=4 pq/d^2=734 \text{ (minimum number).}$$

To represent the 4 age groups, 923 children of Government and Private Schools of both the sexes between 13-16 years of age with no chronic illness, endocrinal problems, physical and mental defects and with parent consent were included.

Data analysis was conducted by SPSS/PC program (version 13 USA). Both univariate and multivariate

analysis were performed to identify the influencing factors of childhood obesity. Chi-square test was used for categorical data and odds ratio was calculated wherever required.

Results

Out of 923 children examined, 70 were overweight and obese. Thus the prevalence of overweight and obesity was 7.6% among high school children. Prevalence of overweight was 6.9% and obesity 1% in boys and overweight was 6.2% and obesity was 1.2% in girls (Table 1).

Prevalence of overweight and obesity was highest (13.8%) at the age of 16 (Table 2)

The association between parents education and prevalence of obesity in children is statistically significant ($P<0.05$). (Table 3)

18 (23.7%) overweight/obese children belonged to class I SES, 30 (14.6%) to class II, 16 (5.9%) to class III, while 6 (1.7%) were of class IV and none in class V. This association was statistically significant ($P<0.001$). (Table 4)

Table 1. Prevalence of overweight and obesity

Gender	Total no.	Non-over weight/ non-obese n(%)	Over weight n(%)	Obese n(%)	Over weight and obese n(%)	95%CI
Boys	408	376(92.2)	28(6.9)	4(1.0)	32(7.9)	5.2–10.6
Girls	515	477(92.6)	32(6.2)	6(1.2)	38(7.4)	5.1–9.7
Total	923	853(92.4)	60(6.5)	10(1.1)	70(7.6)	5.8–9.4

Table 2. Prevalence of overweight and obesity by age and gender

Age(yrs)	Gender	Number	Non-over weight/ Non-obese n(%)	Overweight/ Obese n(%)
13	Boys	146	133(91.1)	13(8.9)
	Girls	181	169(93.4)	12(6.6)
	Total	327	302(92.4)	25(7.6)
14	Boys	146	135(92.5)	11(7.5)
	Girls	157	146(93.0)	11(7.0)
	Total	303	281(92.7)	22(7.3)
15	Boys	91	85(93.4)	6(6.6)
	Girls	144	135(93.8)	9(6.2)
	Total	235	220(93.6)	15(6.4)
16	Boys	25	23(92.0)	2(8.0)
	Girls	33	27(81.8)	6(18.2)
	Total	58	50(86.2)	8(13.8)

Table 3. Association between parent's education and obesity of children

Education	Father			Mother		
	Total	Normal	Overweight/ Obese n(%)	Total	Normal	Overweight /Obese n(%)
0 (No school)	55	54 (98.2)	1 (1.8)	178	174 (97.8)	4 (2.2)
1 (upto7 th)	345	329 (95.4)	16 (4.6)	289	270 (93.4)	19 (6.6)
2 (Till10 th and PUC)	390	357 (91.5)	33 (8.5)	386	348 (90.2)	38 (9.8)
3 (Degree and above)	133	113 (85)	20 (15.0)	70	61 (87.1)	9 (12.9)
Total	923	853	70	923	853	70

 $\chi^2=17.86$

P<0.05, Significant;

 $\chi^2=13.24$

P<0.05, Significant

Table 4. Association between family income and obesity of children

SES	No. of subjects	Normal n(%)	Overweight/ Obese n(%)
I	76	58(76.3)	18(23.7)
II	206	176(85.4)	30(14.6)
III	272	256(94.1)	16(5.9)
IV	354	348(98.3)	6(1.7)
V	15	15(100)	-
Total	923	853	70

 $\chi^2=62.29$

P<0.001, Highly Significant

Table 5. Obesity in relation to family history

Family history of obesity	Normal n(%)	Overweight/Obese n(%)	Total
Yes	213(81.6)	48(18.4)	261
No	640(96.7)	22(3.3)	662
Total	853	70	923

 $\chi^2=60.64$

P<0.001 HS

Table 6. Obesity in relation to diet, physical, household activities and television viewing

	Particulars	Normal n(%)	Overweight/ Obese n(%)	Total	Significance χ^2 and p value	
Type of food	Veg	242(90.6)	25(9.4)	262	5.24	0.07NS
	Egg	127(89.4)	15(10.5)	142		
	Non-veg	484(94.2)	30(5.8)	514		
Snacks	Yes	142(73.6)	51(26.4)	193	123.6	0.001HS
	No	711(97.4)	19(2.9)	730		
Fatty food	Yes	4(12.9)	27(87.1)	31	289.4	0.001HS
	No	849(95.2)	43(4.8)	892		
Physical activity	Yes	821(96.5)	30(3.5)	851	256.4	0.001HS
	No	32(44.4)	40(55.6)	72		
Household activity	Yes	819(94.5)	48(5.5)	867	85.5	0.001HS
	No	34(60.7)	22(39.3)	56		
Television viewing	Yes	377(86.3)	60(13.7)	437	44.73	<0.001HS
	No	476(97.9)	10(2.1)	486		

Table 7. Multivariate analysis of all the variables affecting obesity

Effect	Likelihood ratio tests			Significance
	Chi-Square	df	P-value	
Intercept	-	-	-	-
Physical activity	196.60	1	0.000	HS
Household activity	0.02	1	0.896	NS
Television watching	12.58	1	0.000	HS
Food type	3.45	2	0.179	NS
Fatty food	16.99	1	0.000	HS
Snacks	6.65	1	0.010	S
Father obese	9.90	1	0.002	S
Father's qualification	5.61	4	0.230	NS
Father's occupation	6.32	6	0.389	NS
Mother's qualification	4.10	3	0.215	NS
Mother's occupation	1.63	4	0.804	NS
SES	16.55	4	0.002	S

S: Significant, HS: Highly significant, NS: Not significant
In 18.4% (48) of obese children, there was a parental history of obesity, which was statistically significant ($P < 0.001$). (Table 5)

Among the overweight/ obese children, 9.4% were vegetarians, 10.6% were Eggitarian and 5.8% were non vegetarian. Difference observed was not significant ($P = 0.07$). (Table 6)

Consumption of snacks was more than 3 times a week for 26.4 % (51) of obese children and only 2.6% (19) in non-obese children and this association was statistically significant ($P < 0.001$). (Table 6)

87.1% of children who consumed more fatty foods were overweight and obese ($p < 0.001$). (Table 6)

96.5% of non-obese children and only 3.5% of overweight obese children were involved in more physical activities. As the physical activity increased, prevalence decreased and was significant ($P < 0.001$) (Table 6).

94.5% children who were involved more in household activities were non-obese and 5.5% children who were involved in household activities were obese and was statistically significant ($P < 0.001$) (Table 6). 13.7% (60) TV viewing children were obese and this association was significant ($P < 0.001$) (Table 6).

Multivariate analysis revealed that physical activity, TV viewing, fatty food, snacks, family history of obesity, socio-economic status, were strongly associated with obesity while household activities, type of food, father's and mother's qualification, occupation have indirect influence on childhood obesity (Table 7).

Discussion

Variations in the prevalence of obesity in children, reported in studies, were made in different times, in different places with different parameters. Prevalence of overweight and obesity in this study at the age group of 13,14,15 and 16 years was 7.6%, 7.3%, 6.4%, and 13.8% respectively which was similar to the study by Rama chandran^[5] in Chennai school children.

Parental obesity is considered as criteria to know the genetic influence on childhood obesity. Study by Sheetal Monga among 7-9 years old children in New Delhi showed family history as an important factor for development of obesity in children^[6], which is similar to the present study.

Studies have showed that dietary varieties like sweets, snacks, condiments is positively associated with body fatness; and between 7 to 15 years of age, an excess of approximately 165 Kcal could lead to a theoretical 3kg excess weight largely as fat per year, while variety from vegetables are negatively associated.^[7]

Association between high energy, high fat and junk foods is one of the influencing factor of obesity in childhood^[4]. Amount of energy spent determines the storage of fat. Increase in physical activity was associated with decreasing BMI in girls and in overweight boy^[8] which is similar to this study.

Study by Rose and Erson in USA showed that those who watch 4 or more hours of TV each day had greater body fat and BMI than those who watched less than 2 hours per day^[9] and confirms the positive association of viewing television/ playing computer with childhood obesity. Obesity is due to multifactor etiology. Hence an attempt has been made to ascertain interaction of effects by multivariate analysis.

On the background of higher prevalence of obesity in school children, it is found that social, educational, economic, cultural, psychological and personal factors along with availability of food plays a key role in "food behaviour". Food purchased from fast food outlets, restaurants and other places have become increasingly important part of people's diet^[10] and are upto 65% more energy dense than average diet and intake of nutrients are lower in the population groups which consumes more of them^[11].

Limitation: Actual observation of activities and snacking would have given more scientific value.

Conclusion: Obesity is a product of imbalance between energy intake and energy output. Several factors such as over eating, psychological factors, sedentary life style and genetic predisposition trigger this energy imbalance. Formulation and implementation of intervention (short and long term) measures focusing mainly on increasing the activity of children, such as physical education compulsorily integrated in to school, increasing play ground facilities, and drawing them away from high energy foods by taxation on fatty food and providing psychological support is recommended. Knowledge regarding healthy food habit and life style should be inculcated to the school children and educate the public (Mainly mothers and children) to build healthy future generation by creating awareness to combat childhood obesity.

Acknowledgment: I would like to acknowledge my thanks to all those students without whose co-operation, this study would not have been possible.

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Conflict of interest: Nil

Source of funding: Nil

Date received: June 1st 2017

Date accepted: October 31st 2017