Original article

Relationship between childhood obesity and eating habits in school going children (6 – 11 years) of Central India.

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Abstract

Context: Childhood obesity along with its co-morbidities is expanding rapidly in India due to its evolving economy and urbanization. One of the major causes of childhood obesity is unhealthy eating habits which is an effect of changing life style of the families. Identification of the causative factors is important to limit the expansion of childhood obesity.

Methods and Materials: Obesity and overweight was measured using BMI and cut off points given by IOTF. Pre-validated questionnaire was used to acquire information about eating habits and background characteristics. SPSS software and MS Excel was used for statistical analysis.Data was analysed based on percentages and proportions and relationship between variables and overweight and obesity were established using Chi – square test and multivariate logistic regression analysis.

Results: Overall prevalence of overweight and obesity was 13.5% and 13%, respectively. Eating habits like consumption of junk foods(AOR=2.649, 95% CI=1.737-4.040, p=0.0001), picky/ poor eaters(AOR=2.063, 95% CI=1.382-3.079, p=0.0001), snacking without permission of parents(AOR=2.767, 95% CI=1.205-6.352, p=0.016), easy availability of cookies at home(AOR=1.619, 95% CI=1.025-2.557, p=0.039) were significantly related to overweight and obesity. Prevalence of obesity was found significantly higher in higher income group and nuclear families.

Conclusions: Prevalence of obesity is increasing in Indian children, focussing on the probable role of change in dietary pattern with the increase in income levels. Effective measures needs to be taken by parents, schools and Government to control and reduce the expansion of childhood obesity in the country.

Keywords: BMI, Childhood, Eating Habits, Immunity, Nuclear Family, Obesity, Overweight, Prevalence, School-going children, Socio – economic Status.

Introduction

Childhood obesity is one of the emerging public health challenges. It is increasing rapidly worldwide.[1] It has emerged as an epidemic not only in the developed countries but also in the developing countries that are in rapid epidemiological transition, and India is no exception[2]. According to Bhave (2004)[3], school based data in India demonstrates prevalence of obesity in the range of 5-6% to 24% among children and adolescents. Obesity is an emerging problem in urban and semi urban Indian children.[4]It requires major attention because of association with several risk factors for later heart disease and other chronic diseases including hyperlipidaemia, hyperinsulinaemia, hypertension, and early atherosclerosis.[5]Effective preventive of adult obesity will require prevention and management of childhood obesity.[6]

Obesity is a condition of excessive fatness, either generalized or localized.[7]The Quetlet's index (W/H^2), is a validated measure of nutritional status (Lee and Nieman,1996). The cut off points for children proposed by International Task Force in 2000 are recommended for use in international comparisons of prevalence of overweight and obesity.[8]The new urban life style is having drastic effects in food habits of the family as well as children. Home-cooked meals are on the decline, and pre-prepared fresh and frozen meals are increasingly available. Eating out or bringing home fast food often provides more calories, fat, salt, and sugar than most children need.[9,10]

Several studies and researches have been done in India regarding under-nutrition like PEM, anaemia, vitamin and mineral deficiencies, etc but there are very less data available on obesity and overweight, especially in children.Most of the researches conducted in India regarding overweight or obesity comprises of the population residing in metropolitan and 'X' category cities where there is easy availability and abundance of all kinds of food. Thus, the present study was carried out on the school children of Bhopal district (Y – Category), Madhya Pradesh, where standard of living and economy are still evolving and choices of food are limited.

Subjects and Methods

A cross-sectional epidemiological study was carried out on 600 school going children of age 6 -11 years having varied socio – economic background from four different schools of Bhopal district. The respondents were selected by simple random sampling technique.Oral Consent was obtained from the schools prior to data collection, after explaining the objectives and methods of the study. A pretested questionnaire was distributed among the respondents prior to the day of anthropometric assessment which was to be filled by the parents of the respondents. This questionnaire helped in obtaining the information about the eating habits and background characteristics of the respondents. Ages of the children were calculated by their birth dates. Anthropometric measurements of the subjects were taken using standard equipments and methods. Weight was taken using a digital weighing machine, to the nearest 0.1kg and height was recorded using an inch tape to the nearest 0.1 cm. Waist, hip and mid arm circumference was also taken using an inch tape to the nearest of 0.5 cm. Bicep and triceps skin – fold thicknesses were taken using a skinfold callipers. All measurements were taken with the respondents' barefoot and wearing light loose clothing.

BMI was calculated using Quetlet's Index as weight in kilograms/ (height in $m)^2$.Cole's cut off values for BMI in children were used to assess overweight and obesity in children. Prevalence of obesity was represented as percentage. Central tendency and level of dispersion in the population were calculated using statistical equations and methods like mean, median, maximum, minimum, standard deviation and coefficient of. 11 Chi – square test and multivariate logistic regression analysis was done to establish relationship between obesity and risk factors regarding eating habits. SPSS 16.0 and Microsoft Excel 2007 were used for data analysis.

Results

Prevalence

Prevalence of obesity is presented as percentage. The study included heterogeneous group which included both males and females. Prevalence was assessed according to age group and gender of the respondents. Fig.1 shows the prevalence of respondents.

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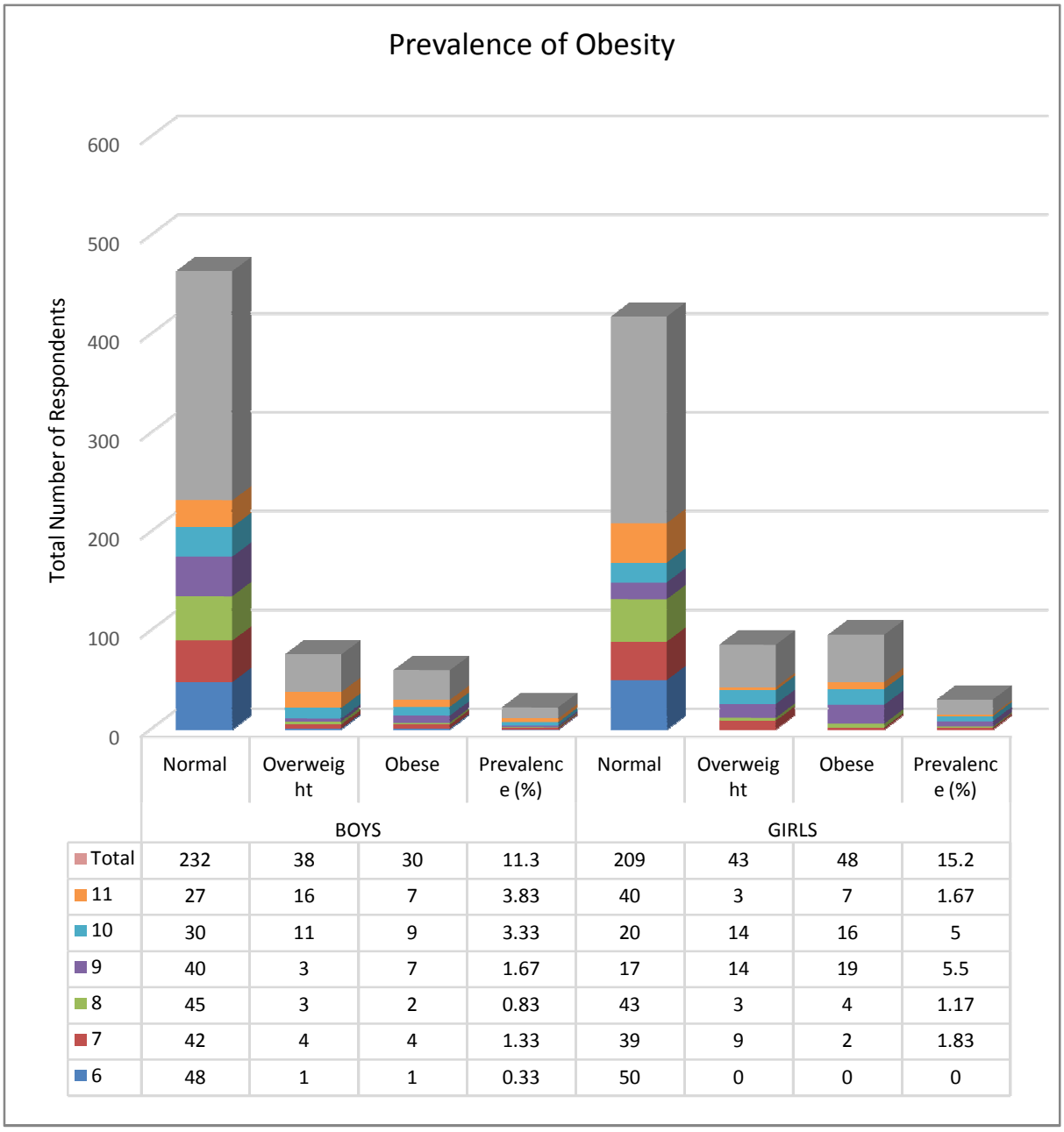
Fig.1: Nutritional Status of respondent according to BMI



	BOYS				GIRLS			
	Normal	Overweight	Obese	Prevalence (%)	Normal	Overweight	Obese	Prevalence (%)
Total	232	38	30	11.3	209	43	48	15.2
11	27	16	7	3.83	40	3	7	1.67
10	30	11	9	3.33	20	14	16	5
9	40	3	7	1.67	17	14	19	5.5
8	45	3	2	0.83	43	3	4	1.17
7	42	4	4	1.33	39	9	2	1.83
6	48	1	1	0.33	50	0	0	0

According to BMI, the overall prevalence of obesity and overweight was 13% (78 respondents)and 13.5% (81 respondents), respectively. Females showed a higher prevalence of overweight and obesity (15.2%) than males (11.3%). Among boys, prevalence of obesity and overweight was higher in the age group of 11 years compared to other age groups and among the girls, it was seen higher in the age group of 9 year olds.

Association between Childhood Obesity and Eating Habits : Association between key risk factors related to eating habits and obesity was examined through univariate analysis by applying Chi-square test. Variables with significant association ($p<0.05$) were entered into a multivariate logistic regression model.

Table1: Risk factors of Childhood Obesity associated with Eating Habits of the respondents.

Food Habits	AOR	Sig.	95% C.I.for AOR	
			Lower	Upper
Food likes				
Home cooked food	Ref			
Junk food	1.919	.003	1.253	2.939
Picky/poor eater				
No	Ref			
Yes	2.063	<0.0001	1.382	3.079
Eat snacks/ sweets without permission				
Never	Ref			
Sometimes	1.200	.385	.795	1.812
Frequently	2.767	.016	1.205	6.352
Frequency of junk foods				
Never	Ref			
Sometimes	2.649	<0.0001	1.737	4.040
Frequently	2.134	.077	.921	4.945
Snacks usually found at home - Cookies				
No	Ref			
Yes	1.619	.039	1.025	2.557
Constant	.052	<0.0001		

Respondents who like junk food (AOR=1.919, 95% CI=1.253-2.939, p=0.003) and consumed junk food even sometimes were about 2 times more at risk of obesity (AOR=2.649, 95% CI=1.737-4.040, p<0.0001). Respondents who were picky/ poor eater were also 2 times more likely to be obese (AOR=2.063, 95% CI=1.382-3.079, p<0.0001). Respondents who frequently ate snacks/ sweets without permission of their parents were about 3 times more at risk of obesity (AOR=2.767, 95% CI=1.205-6.352, p=0.016). Also, respondents from homes where usually and frequently cookies were found were 1.7 times at higher risk of obesity (AOR=1.619, 95% CI=1.025-2.557, p=0.039). This clearly indicates that un-healthy food habits are strongly associated with obesity in children.

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Table 2: Relationship between Immunity, Dental Health and BMI of respondents.

		Body Mass Index Categories						Total	
		Normal		Overweight		Obese			
		Count	Row %	Count	Row %	Count	Row %	Count	p-value
Recurrent illness/ infection	No	432	74.0%	80	13.7%	72	12.3%	584	
	Yes	9	56.3%	1	6.3%	6	37.5%	16	
	Total	441	73.5%	81	13.5%	78	13.0%	600	0.012*
Dental Health	Healthy	340	79.3%	51	11.9%	38	8.9%	429	
	Cavities	101	59.1%	30	17.5%	40	23.4%	171	
	Bleeding Gums	0	0.0%	0	0.0%	0	0.0%	0	
	Mottled Enamel	0	0.0%	0	0.0%	0	0.0%	0	
	Total	441	73.5%	81	13.5%	78	13.0%	600	<0.0001*

Table 3 shows a significant relationship between recurrent infection and nutritional status of the respondents (p value = 0.012). Also, dental health of the respondents was related to obesity (p value <0.0001), i.e., respondents who were overweight or obese suffered from poor dental health, they had dental carries and cavities.

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Table 3: Relationship between Family characteristics and BMI of respondents.

Family Characteristics		Body Mass Index Categories						Total	
		Normal		Overweight		Obese			
		Count	Row %	Count	Row %	Count	Row %	Count	p-value
Type of family	Nuclear	329	69.9%	73	15.5%	69	14.6%	471	
	Joint	112	86.8%	8	6.2%	9	7.0%	129	
	Total	441	73.5%	81	13.5%	78	13.0%	600	**0.001***
Family Income category	LIG	49	89.1%	2	3.6%	4	7.3%	55	
	MIG	305	78.2%	43	11.0%	42	10.8%	390	
	HIG	87	56%	36	23%	32	21%	155	
	Total	441	73.5%	81	13.5%	78	13.0%	600	**<0.0001 ***

Table 2. Shows that there is a significant relationship between obesity and the socio – economic status of the respondents *(p value=0.0001)*, also, type of family showed a statistical significant association with obesity in the respondents *(p value=0.001).* Respondents belonging to higher income group and living in nuclear families has a higher chance of getting overweight or obese.

Discussion

It is indeed ironic that a problem of "plenty" *viz.*, childhood obesity, has emerged while we are still fighting undernutrition and infectious disease.[11] However, the adverse and serious consequences of childhood obesity arenow proven beyond doubt.[12,13]

This study was conducted in four different schools of Bhopal district which included both public and private sector schools. The sample comprised of heterogeneous group in which respondents were of different gender, ethnicity, religion and socio – economic status. In this study, overall 13.5% of the respondents were overweight and 13% were found to be obese, which was in accordance with some other studies conducted in Indore(14.97%)[14], Bengaluru (13.1%)[15], Meerut (13.5%)[16]. Some other studies have reported lesser prevalence[17-20] or a very high prevalence[21] which may be due to the difference in the effect of associated factors and/or the methodology used. Girls showed a higher percentage of overweight and obesity prevalence than boys (15.2% > 11.3%) which was proved statistically (AOR = 1.569, 95% CI = 1.069-2.301, p=0.021). Similar result were also seen in studies conducted in Mysore[22], Puducherry[23] and Devangere City[24].

Some of the eating habits showed association with overweight and obesity. With changing lifestyle and standard of living, eating habits are also transforming. Also, easy availability of ready to cook premixes and junk foods in the market as well as home is liable to this. Children who are fussy and selective about their food choices are more likely to be obese (AOR=2.063, 95% CI=1.382-3.079, p<0.0001), they do not get all the required nutrients and rather acquire only calories. Children liking and indulging in consumption of junk food frequently or even sometimes are at a risk of developing obesity (AOR=1.919, 95% CI=1.253-2.939, p=0.003,AOR=2.649, 95% CI=1.737-4.040,

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p<0.0001), few other studies have also shown to have similar findings [24 – 27]. Junk foods are calorie dense and usually contain simple carbohydrates and fats, frequent consumption of which may lead to increase of fat mass in the body leading to obesity. Also, children indulging in snacking without the permission of their parents have a higher probability of getting obese (AOR=2.767, 95% CI=1.205-6.352, p=0.016), because then there is no or less control over the food choices and the quantity of food consumed. Cookies are the most easily available and liked junk food, easy and frequent availability of them at home increases the risk of obesity in children (AOR=1.619, 95% CI=1.025-2.557, p=0.039).

Socio – economic status and type of family were significantly associated with obesity in the respondents (p value = <0.0001and p value = 0.001, respectively). Children coming from higher socio – economic group and nuclear families were seen overweight and obese. This can also be the reason for the change in dietary habits of these children. With the improving economic status and decreasing size of families, people are spending more on eating out, junk food, ready to cook meals, etc. and socializing which may again involve indulging in wrong choices of food. A study conducted on urban children of South India showed that daily energy intakes increased with increased frequency of eating out (P <0.001)[28].Although problem of dental cavities was common among all the groups, but it showed a statistical significance with obesity (p = <0.0001). This may be due to the possibility of greater consumption of simple sugars, junk foods and aerated beverages, which are also the major cause of development of dental carries.

To summarize the present study illustrates that occurrence of childhood obesity is increasing in India, highlighting the probable role of changes in the eating habits and pattern brought upon by the evolving economic expansions and conditions in the country. Modifying and controlling the eating habits of children will help in preventing or rectifying overweight and obesity conditions. Children should be encouraged and taught to develop healthy eating habits by their parents and teachers. Availability of junk foods and ready to eat premixes at home should be less or none and accessibility of outside food joints and canteens by the child should be checked. The diet of the children should be balanced having variety of food items from different food groups so that they get all the essential nutrients, rather than just satiating their hunger. Parents are usually concerned that their children are very thin and then they tend to forcefully over – feed the child which in turn can lead to obesity. Thus, parents should be edified and made aware by dieticians and healthcare professionals that healthy is not a synonym of fat, children need not be chubby or fat in appearance, rather their activity and immunity levels should be high. Schools should organize interactive and informative sessions regarding healthy diet and lifestyle for the parents and children that will promote healthy habits and behaviour in them.

Conclusion

The overall overweight and obesity prevalence in the population came out to be 13.5% and 13%, respectively. Prevalence of obesity and overweight was higher in girls than boys.

Assessment of these children showed an association of dental health and recurrent illness/infection with obesity. Respondents who were overweight and obese manifested cavities in their teeth and falling ill easily and frequently, which shows low immunity. This shows the lack of essential micro-nutrients in their diet and high intake of calorie dense food items. Children who liked junk food more, did not eat well and were

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choosy about their food were overweight or obese. Overweight and obesity was also prevalent in children who indulged in snacking without the permission of their parents, sometimes or frequently ate junk and fast food and ate certain foods for psychological satisfaction. Food habits like vegetarian or eating foods of animal origin and daily serving of fruits and vegetables did not have a significant relationship with obesity or overweight, but families having easy accessibility of cookies had higher percentage of obese and overweight children. Nuclear family and higher socioeconomic status were risk factors for obesity and overweight.

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