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Original Research Article

Food habits and obesity: a study in adolescents

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ABSTRACT

Background: In India under nutrition was common but off late overweight and obesity, the diseases of over nutrition, has gained a foothold.
Methods: This is a cross sectional study done in schools of Greater Noida city to see the food habits of adolescents and assess its impact on health in terms of being overweight and obesity. A total of 600 school children were included in the study. 4.0% (24) students were found to be obese while 12.8% (77) were overweight.
Results: In this study, boys were more commonly overweight (44 out of 353, 7.3%) than girls (33 out of 247, 5.5%) while obesity prevalence was comparable in both the sexes (11 out of 353 i.e. 1.8% in boys and 13 out of 247 i.e. 2.1% in girls).
Conclusions: Pearson's correlation shows that BMI is significantly related to all the asked dietary habits at 0.05 levels and it is the frequency of having meals outside or skipping breakfast that is important.

Keywords: Adolescents, BMI, Diet pattern, Greater Noida, Obesity

INTRODUCTION

The calculated global prevalence of overweight (including obesity) in children aged 5-17 years is estimated by the International Obesity Task Force (IOTF) to be approximately 10%, but this is 'unequally distributed' with prevalence ranging from over 30% in Americas to <2% in Sub Saharan Africa.[1] Prevalence of obesity in India ranges from 6%-8%. Tendency for overweight is more. In India under nutrition was common but off late overweight and obesity, the diseases of over nutrition, has gained a foothold. International Obesity Task Force (IOTF) classifies overweight as children with BMI value between 85th to 95th percentile and obesity as BMI value above 95th percentile for a specific age and sex.[2]

Overweight and obesity were diseases more common in the western world because of their dietary habits and sedentary lifestyle but now it is increasingly seen in children in India. Though more common in higher socio economic strata it is not uncommon in middle and low income groups.

Obesity and overweight have traditionally being linked to intake of high calorie food and lifestyle but it is now seen that certain habits like skipping breakfast, being selective about food, etc. are also important determinants. Being selective about food is defined as only eating favourite foods and not eating foods that are disliked. Such habits are quite common in children and adolescents.

Obesity in childhood and adolescents is associated a number of complications like, psychological stress, cardiovascular disease, orthopaedic problems, etc. Unless detected early, obesity in adolescence tends to track in adulthood and cause problems. Florentino RF et al emphasised that the emerging problem of overweight and

obesity in children and adolescents has arisen from the changing dietary pattern towards energy-dense and high-fat diets, together with the rising urbanization that has brought about a more sedentary lifestyle.[3] The high glycaemic index of our predominantly carbohydrate diet may be responsible for hyperinsulinism, weight gain and eventual type 2 diabetes.

Neel JV et al opined that modern environment may have unmasked previously silent obesogenic genes 'thrifty genotypes'.[4] Astrup et al observed that the prevalence of overweight and obesity has also increased substantially in the nutritional transition countries, and the health burden of obesity-related complications is growing.[5] The introduction of fast-food chains and Westernized dietary habits providing meals with fast-food characteristics seems to be a marker of the increasing prevalence of obesity. The mechanisms involved are probably that the supply of foods is characterised by:

- Large portion sizes
- High energy density
- Sugar rich soft drinks.

The high-energy density of foods is partly brought about by a high dietary fat content. In addition, fast food from major chains in most countries still contains unacceptably high levels of industrially produced Tran's fatty acids that have powerful biological effects, and contribute to type 2 diabetes and coronary artery disease. New evidence also suggests that a high intake of Trans fat may produce abdominal obesity, an important factor in the metabolic syndrome, type 2 diabetes and cardiovascular disease. The optimal diet for the prevention of weight gain, obesity, metabolic syndrome and type 2 diabetes is fat-reduced, without any industrially produced trans fatty acids, fibre-rich, high in low energy density carbohydrates (fruit, vegetables and whole grain products) and with a restricted intake of energy-containing drinks.

According to the Joint WHO/FAO Expert Consultation6 diet should comprise of:

- < 1% Trans fat
- Adequate PUFA
- <5gm of common salt
- >400gm/day of fruits & vegetables
- Whole grain > 25 gm/d of total dietary fibre
- Free sugars < 10% of total energy.

IAP1 recommends Thali approach: "think of a day's food composition as a 'Thali' wherein 50% (half) is full of vegetables, salads and fruits.[1] A quarter (25%) should be made up of cereals such as rice and/or chapattis and the remaining quarter should be protein based (dal/milk/egg/animal protein)". Fried, snacks and 'sweet dishes' are only for a very few special occasions. There are many ways of determining whether a person is overweight or obese. Easiest being estimating BMI, waist hip ratio and checking TSFT. Standard cut offs are available for comparison. To assess the dietary pattern in adolescents and its impact this study was undertaken in schools of Greater Noida city.

METHODS

This is a cross sectional study conducted in the urban schools of Greater Noida city among the students of class 8th to 12th std. Schools were selected randomly from the list of secondary and senior secondary schools of Greater Noida city. All the children belonging to either gender in the age group of 13 - 18 years, who were apparently healthy were included in the study. Cross sectional study was done using simple random sampling. 600 people were taken for the study.

Inclusion criteria

- All children of either gender of 13-18 years. who were free from any chronic illness were included in the study.

Exclusion criteria

- Child having any chronic illness e.g. rheumatic heart disease, hereditary anaemia, endocrine disorders, etc, was excluded from the study.

Written consent was taken from appropriate authority before inclusion into the study. Information about dietary habits was obtained using a self-administered questionnaire based on the US NHANES III study (diet behavior and nutrition-dbq) but modified for the local food culture.

The questionnaire consisted of queries regarding the frequency of eating at home or outside the home, the usual frequency of having foods and beverages such as Western fast food and non- vegetarian food. Soft drinks, fruits, sweets and chocolates, having foods and beverages outside the three main meals, and being selective about food (defined as only eating favourite foods and not eating foods that are disliked). Respondents were asked to select an answer that most appropriately described their dietary habits. Then each student underwent a complete physical examination, anthropometry including weight and height was taken. BMI was calculated. All subjects with BMI ≥ 85 percentile for age and sex was defined as overweight and ≥ 95 percentile as obese. Pearson's correlation used to assess the relation between dietary pattern and anthropometry.

RESULTS

A total of 600 school children were included in the study. 353 were males and 247 females (Figure 2). 4.0% (24) students were found to be obese while 12.8% (77) were overweight. In 9% (54) children, BMI was below 3rd centile (Table 1). In this study, boys were more

commonly overweight (44 out of 353, 7.3%) than girls (33 out of 247, 5.5%) while obesity prevalence was comparable in both the sexes (11 out of 353 i.e. 1.8% in boys and 13 out of 247 i.e. 2.1% in girls) (Table 2).

Table 1: BMI distribution.

BMI	Frequency	Percentage
Less than 85p	499	83.1
Between 85-95 p	77	12.8
More than 95 p	24	4.0
Total	**600**	**100.0**

The prevalence of obesity was more in high socioeconomic class (34) 5.6% as compared to (20) 3.8 %, (14) 2.3% in middle and lower socioeconomic classes respectively while that of overweight was comparable. Maximum students who were overweight and obese were in the 18 year age group. Pearson's correlation shows that BMI is significantly related to all the asked dietary habits at 0.05 levels (Table 4) and it is the frequency of having meals outside or skipping breakfast that is important.

Table 2: Distribution of overweight and obesity (on the basis of BMI).

Overweight	77
Males	44 (7.3%)
Females	33 (5.5%)
Obese	24
Males	11 (1.8%)
Females	13 (2.1%)

Table 3: Frequency and percentage of students with various eating habits.

		Males		Females			
Questions	**Answer**	**Freq.**	**%**	**Freq.**	**%**	**Total Freq.**	**% (of total)**
Skipping breakfast	Occasionally	182	51.5	143	57.8	325	54.1
	Daily	171	48.4	104	42.1	275	45.8
Out for breakfast	occasionally	268	75.9	215	87.0	483	80.5
	Daily	60	16.9	57	23.0	117	19.5
Frequency out for lunch(times/week)	Never	238	67.4	197	79.7	435	72.5
	1to 2	95	26.9	37	14.9	132	22
	3 to 4	7	1.9	8	3.2	15	2.5
	≥5	13	3.6	5	2.0	18	3
Frequency of morning snacks (times/ day)	None	215	60.9	136	55.0	351	58.5
	1	120	33.9	95	38.4	215	35.8
	1 to 2	11	3.1	9	3.65	20	3.3
	≥3	7	1.9	7	2.8	14	2.3
Frequency of afternoon snacks (times per day)	None	39	11.0	31	12.5	70	11.6
	1	176	49.8	136	55.0	312	52
	1 to 2	127	35.9	72	29.1	199	33.1
	≥3	11	3.1	8	3.2	19	3.1
Frequency of having foods outside 3 main meals (times/day)	None	280	79.3	197	79.7	477	79.5
	1	45	12.7	33	13.3	78	13
	1 to 3	19	5.3	8	3.2	27	4.5
	≥5	9	2.5	9	3.6	18	3
Usual consumption of soft drinks (*bottles /day)	None	272	77.0	200	80.9	472	78.6
	1	42	11.8	36	14.5	78	13
	1 to 2	21	5.9	9	3.6	30	5
	≥3	11	3.1	9	3.6	20	3.3
Frequency of sweets or chocolates (times/week)	None	158	44.7	130	52.6	288	48
	1 to 3	130	36.8	77	31.1	207	34.5
	4 to 6	43	12.1	22	8.9	65	10.8
	≥7	22	6.2	18	7.2	40	6.6
Frequency of Western fast food (times/month)	0	117	33.1	80	32.3	197	32.8
	1	120	33.9	96	38.8	216	36
	1 to 2	86	24.3	46	18.6	132	22
	≥3	30	8.4	25	10.1	55	9.1
Frequency of mutton and chicken soup (times/month)	0	222	62.8	178	72.0	400	66.6
	1	73	20.6	47	19.0	120	20
	1 to 4	36	10.1	14	5.6	50	8.3
	≥4	22	6.2	8	3.2	30	5
Selective about food	No	219	62.0	153	61.99	372	62
	Yes	134	37.94	94	38.0	228	38

Table 4: Questions and their Pearson's correlation with BMI.

Questions	BMI (p value)
Skipping breakfast	
Occasionally	0.210
Daily	0.010
Out for breakfast	
Occasionally	0.321
Daily	0.034
Frequency of out for lunch (times/week)	
Never	0.081
1-2	0.064
3-4	0.045
≥5	0.030
Freq of morning Snacks (times/day)	
None	0.060
1	0.077
2	0.065
≥3	0.041
Freq of afternoon Snacks (times/day)	
None	0.214
1	0.076
2	0.081
≥3	0.042
Freq of having foods outside 3 main meals (times/day)	
None	0.072
1	0.064
2-3	0.041
≥5	0.002
Usual consumption of soft drinks (bottles of 500 ml/day)	
None	0.071
<1	0.063
1-2	0.050
≥3	0.041
Freq of sweets or chocolates (times/week)	
None	0.081
1-3	0.064
4-6	0.035
≥7	0.024
Freq of western fast foods (times/month)	
None	0.120
1	0.094
2	0.041
≥3	0.035
Freq of mutton or chicken soup (times/month)	
None	0.238
1	0.071
2-4	0.061
>4	0.038
Selective about food	
Yes	0.048
No	0.129

DISCUSSION

The low overall prevalence of overweight and obesity in the present study could be attributed to the fact that majority of students who participated belonged to middle income group, in whom the prevalence of Overweight / Obesity is known to be low. The prevalence of obesity in this study is comparable to a study by Ramesh et al7in Ahmedabad. The higher prevalence of both overweight & obesity in boys can be attributed to the skewed sex ratio and the fact that boys are usually more pampered in Indian household.

Maximum students with overweight and obesity were in the 18 year age group. This is probably because this is the age in which children get to spend money on their own without parental supervision, are highly influenced by advertising media, they like to experiment and last but not the least peer pressure. Also this is the time when students have to appear for board examinations and other competitive exams, they spend hours together studying. So they don't have enough of physical activity and end up being overweight or obese.

In this study skipping breakfast is associated with high BMI. This correlates with a number of studies.[9,10] This could be because of an overall increase in the amount of food consumed due to hunger, during the day, by those who skipped breakfast, thus contributing to their weight gain.

Snacking habit and increased consumption of soft drinks correlated with overweight/obesity in the study these corroborates with studies by Mozaffer et al and Forslund et al.[11,12] Frequent snacking prevents utilization of stored energy and blunts the insulin response. It may eventually lead to insulin resistance and metabolic syndrome. Increased consumption of soft drinks, sweets, chocolates and western fast foods (energy dense foods) are seen to be significantly related to high BMI in this study. In a similar study in China by Ming Li et al significant relation was found between the consumption of breakfast outside the home, soft drinks and energy-dense fast foods and overweight and obesity in adolescents. In a study by Ramesh et al junk food and chocolate eating habits was found to be having more prevalence in obese and overweight.[13,14]

In this study having food in addition to three main meals is correlated with overweight/obesity while such association was not seen in the study by Ming Li et al.[13] This is probably because the type food taken in-between varies in these two populations. Being selective about food is related with overweight / obesity in this study but a negative association was between them in the study by Ming Li et al, this again can be because children preferred oily foods in comparison to simple food.[13] Further study to see what kind of food children prefer would probably clarify. Having food in addition to three main meals and being selective about food are found to be related with overweight/obesity. This again can be because children preferred oily foods in comparison to simple food.

CONCLUSION

BMI is significantly related to dietary habits. Dietary habits are one of the major determinants of overweight/obesity. Habit of skipping breakfast and being selective about food has been found to be strongly related overweight/obesity. Other factors like type of food, having sweets, etc. becomes important if taken regularly or at high frequency. So interventions are needed starting at school level, kids should be taught about importance of regular and balanced diet, physical activity. Schools are probably the ideal medium of intervention as they are central to children's lives and information can be relatively quickly dissipated through this channel. For this teachers should be trained in lifestyle, nutrition and activity. Canteens can be instructed to provide healthy foods; physical activity should be made mandatory in schools and colleges. Parents should adopt a healthy lifestyle and can thus become role model for their kids. Successful intervention for obesity is best accomplished using multimodal approaches to accomplish substantial lifestyle changes. A combination of nutritional advice, exercise and cognitive behavioural approaches usually works best. Proper healthy diet should be advised. Advice regarding physical activity: at least 30 min/d (WHO move for health). Psychological strategies e.g., the traffic light diet plan

Motivational interviewing

At the community and public health levels, examples of successful programs employing these strategies are few, particularly in the South Asian region. Singapore has led the region in successfully implementing a program on physical activity and nutrition in schools. E.g.: The Trim and Fit Program managed by the Ministries of Education and Health, Singapore. The onus lies on the parents, teachers, peer groups and social media to combat the growing menace of obesity.

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