Original Research Article

Dietary Pattern and Obesity among Adoloscents: A Cross Sectional Study

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ABSTRACT

Background: *Obesity is a complex condition with serious social and psychological dimensions, that affects virtually all age and socioeconomic groups and threatens to overwhelm both developed and developing countries. This problem is increasing in adolescents and various factors contribute to it.*

Method: *A cross sectional study was conducted among adolescents studying in high school. Totally1718 study subjects were included for the study. Relevant information was collected by self-administered proforma. Body mass index was used to find obesity*

Results: *The prevalence of overweight and obesity among adoloscents was 19.2%. The prevalence of overweight alone is 12.4% and obesity is 6.8%. Modifiable dietary factors are significantly associated with overweight/obesity.*

CONCLUSION: *There is significant association between consumption of sweets, egg, meat, and snacks and prevalence of overweight / obesity*

Keywords: *Overweight, Obesity, Body Mass Index.*

INTRODUCTION

Food and eating are pleasurable and essential to life. However, the abundance of palatable food items in post-industrialized societies has created problems both at the individual and societal levels. The rapidly increasing prevalence of obesity worldwide is a major public health problem, and many people are struggling to prevent weight gain or are trying to lose weight. In 2007, 66% of men and 53% of women in Finland were overweight, i.e. had a body mass index (BMI) of 25 kg/m² or higher, and 21% were obese (BMI 30 kg/m²) (Diet consists of combinations of foods, and these individual components may have interactive or synergistic effects that make studying dietary factors in isolation difficult[1]. The current obesogenic environment has been considered to be a causal factor underlying the obesity epidemic: technological development has reduced the need for physical activity, and food is more plentiful, accessible and palatable than ever before. Together, these two factors cause excess energy intake compared to energy expenditure, leading to weight gain. However, not all individuals gain weight, and this variability between individuals has generated a vast amount of research from perspectives ranging from genetic and biological to social and cultural. Body weight is highly heritable, and from 60% to 80% of within population variation in weight has been estimated to be due to genetic differences between individuals[2]. Dietary patterns that represent a combination of foods may be more strongly associated with disease risk than an individual food or nutrient[3,4,5]. Previous studies have reported that dietary patterns that are high in fruits, vegetables, and fiber might be associated with a reduced risk of obesity[6]. The European Prospective Investigation into Cancer and Nutrition (EPIC) Potsdam cohort found that dietary patterns that are high in fruit, and vegetables and low in high-fat dairy are associated with significantly less weight gain over a 4-year period[7]. In a US study, consuming a diet high in fruit, vegetables, and reduced-fat dairy, and low in meat, fast food, was associated with smaller gains in body mass index and waist circumference[8]. However, no study has investigated associations between dietary patterns and obesity.

METHODOLOGY

A cross sectional study was carried out among adolescents studying in high schools. Permission from respective authorities was taken and information related to dietary pattern was collected by asking the selected study subjects to fill the pre designed proforma. The students studying in high school formed the study subjects and the students not willing to participate in study were excluded. By simple random sampling technique, 5 schools were selected and the list of students studying in selected high school formed the sampling frame, from this the required number of students selected for the study. Based on pilot study result, the sample size was fixed. By setting alpha error at 5% and beta error at 20%, the sample size was found to be 850. But to overcome the design effect, the sample size was doubled and fixed to 1718. Data was collected in a pre-designed proforma. Height and eight were measured by following standard methods and BMI was calculated. IOTF classification was adopted for the study. Ethical approval from institution was

taken. Data was entered in Microsoft excel and was analyzed using SPSS 20.0.

RESULTS

Table 1: Relation between Food habit and overweight/obesity

Food habit	Overweight / obese		Others#		Total*	
	N	%	N	%	N	%
Non veg.	304	18.4	1346	81.6	1650	*96.0*
Veg.	10	14.7	58	85.3	68	*4.0*
Total	**314**	**18.3**	**1404**	**81.7**	**1718**	*100*

* (%) – column percentage   # Underweight and Normal weight
Chi square value – 0.60   df-1   p value – 0.43
Odds ratio – 1.31 (95% CI; 0.64 – 2.76)
96% of study subjects are non-vegetarians and only 4% are vegetarians. The prevalence of overweight/obesity is 18.4% among non-vegetarians and is 14.7% among vegetarians. Even though the difference is of 3.7%, it is not statistically significant.

Table 2: Relation between eating food/snacks between breakfast-lunch-supper and overweight/obesity

Eating b/w BF-LU-SU	Overweight / obese		Others#		Total*	
	N	%	N	%	N	%
Yes	267	18.4	1186	81.6	1453	*84.6*
No	47	17.7	218	82.3	265	*15.4*
Total	**314**	**18.3**	**1404**	**81.7**	**1718**	*100*

* (%) – column percentage   # Underweight and Normal weight
Chi square value – 0.06   df-1   p value – 0.80
Odds ratio – 1.04 (95% CI; 0.73 – 1.49)

84.6% of study subjects have the habit of taking food/snacks in between breakfast – lunch – supper and only 15.4% did not have this habit.
The prevalence of overweight/obesity is slightly high among those who have this habit (18.4%) compared to those without this habit (17.7%). This association is not statistically significant.

Table 3: Distribution of study subjects based on eating food from Fast food centre

Eating from Fast food/week	Frequency	Percent
No	544	31.7
1-2 times	848	49.4
3-4 times	188	10.9
> 4 times	138	8.0
Total	**1718**	**100.0**

31.7% of the study subjects do not take food from fast food centre and the proportion of study subjects who eat food from fast food centre 1-2 times. 3-4 times and >4times is 49.4%, 10.9% and 8.0% respectively.

Table 4: Relation between eating food from Fast food centre and overweight/obesity

Fast food	Overweight / obese		Others#		Total*	
	N	%	N	%	N	%
Yes	256	21.8	918	78.2	1174	*68.3*
No	58	10.7	486	89.3	544	*31.7*
Total	**314**	**18.3**	**1404**	**81.7**	**1718**	*100*

* (%) – column percentage   # Underweight and Normal weight
Chi square value – 30.90   df-1   p value – 0.00
Odds ratio – 2.33 (95% CI; 1.72 – 3.917)

The prevalence of overweight and obesity is high among study subjects who eat food from fast food centre (21.8%) compared to those who do not eat from fast food centre (10.7%) which is statistically significant.

Table 5: Relation between frequency of eating food from Fast food centre and overweight/obesity

Fast food	Overweight / obese		Others#		Total*	
	N	**%**	**N**	**%**	**N**	**%**
>2times/week	133	40.8	193	59.2	326	*27.8*
1-2times/week	123	14.5	725	85.5	848	*72.2*
Total	**256**	**21.8**	**918**	**78.2**	**1174**	*100*

* (%) – column percentage   # Underweight and Normal weight
Chi square value – 95.47   df-1   p value – 0.00
Odds ratio – 4.06 (95% CI; 3.03 – 5.44)
Among the study subjects who give h/o taking food from fast food centre (1174), the prevalence of overweight / obesity is found to be high among those who take fast food for more than 2 times/week (40.8%) compared to those who take 1-2 times/week. This is statistically significant.

Table 6: Relation between food frequency and overweight/obesity

Food item	Overweight/ obese	Others#	Total	Odds ratio	95% CI	P value
Sweets						
1-7 times/week	244 (19.5%)	1006 (80.5%)	1250	1.38	1.02 – 1.86	**0.02**
< 1time/week Or never	70 (15%)	398 (85%)	468			
Egg						
1-7 times/week	188 (20%)	755 (80%)	943	1.28	0.99 – 1.66	**0.04**
< 1time/week Or never	126 (16.3%)	649 (83.7%)	775			
Meat						
1-7 times/week	132 (21.8%)	475 (78.2%)	607	1.42	1.10 – 1.84	**0.00**
< 1time/week Or never	182 (16.4%)	929 (83.6%)	1111			
Milk / curd						
1-7 times/week	226 (17.2%)	1084 (82.8%)	1310	1.26	0.91 – 1.74	**0.14**
< 1time/week Or never	58 (14.2%)	350 (85.8%)	408			
Ice creams						
1-7 times/week	94 (18.8%)	408 (81.2%)	502	1.04	0.79 – 1.36	0.75
< 1time/week Or never	220 (18%)	996 (82%)	1216			
Snacks						
1-7 times/week	264 (19.3%)	1103 (80.7%)	1367	1.44	1.03 – 2.03	**0.02**
< 1time/week Or never	50 (14.2%)	301 (85.6%)	351			
Vegetables						
1-7 times/week	272 (17.8%)	1256 (82.2%)	1528	0.76	0.52 – 1.12	0.14
< 1time/week Or never	42 (22.1%)	148 (77.9%)	190			
Fruits						
1-7 times/week	221 (18.3%)	987 (81.7%)	1208	1.00	0.76 – 1.31	0.97
< 1time/week Or never	93 (18.2%)	417 (81.8%)	510			

Underweight and Normal weight
Note – Information regarding food frequency is taken for last one month and then categorized into 1 – 7times/week and <1time/week (means taken occasionally in a month) or never
The frequency of food intake of sweets, egg, meat, milk/curd, ice creams, snacks, vegetables and fruits was analyzed. There is significant association between consumption of sweets, egg, meat, and snacks and prevalence of overweight / obesity.

DISCUSSION

The present study revealed that the combined prevalence of overweight and obesity is 18.3%. The prevalence of overweight alone is 12% and obesity is 6.3%. Comparing the results of this study with other studies in India revealed that the prevalence of overweight is consistent with other studies whereas the prevalence of obesity is high. The prevalence study of obesity among adolescents in public schools of Ludhiana, catering to the affluent segment of population, showed that 12.7% adolescents were overweight and 3.4% were Obese based on age and sex specific Body mass index (BMI) cut off points[9]. Another study carried out in Amritsar district of Punjab found that the prevalence of overweight is 10.94% and obesity 5.62%[10]. It has been found in this study that sweets, egg, meat, and snacks are highly significant in increasing the prevalence of overweight/obesity. The prevalence is less among students taking vegetables 1-7 times/week. Similarly other studies also showed that dietary variety of sweets, snacks, condiments, entrees and carbohydrates is positively associated with body fatness whereas variety from vegetables is negatively associated [11,12]. Non vegetarians have a higher prevalence of overweight/obesity (18.4%) compared to vegetarians (14.7%). The study subjects who eat food from fast food centre showed a risk of having overweight/obesity 2.33 times that of subjects who do not eat food from fast food centre and it is also observed that the prevalence of overweight / obesity is found to be high among those who take fast food for more than 2 times/week (40.8%) compared to those who take 1-2 times/week. In the past 10 years in Kerala there has been a tremendous growth in the number of fast food joints and the frequency of children eating out has also gone up, coupled with the increased number of children with pocket money. All this has changed the diet to a high fat, high sugar low fiber diet and resulted in increase of prevalence. Similar diet patterns have shown high prevalence in various other studies too[11,12,13]. There is no much difference in the prevalence between students having habit of taking snacks/food in-between meals and students without this habit. In a study carried out in UAE, obesity among students was associated with food intake between meals and in particular fast foods[14].

CONCLUSION

The prevalence rates of childhood overweight and obesity is comparatively high. From the practice perspective, several significant yet inconsistent statistical associations between dietary patterns and childhood overweight/obesity in adolescents were found.

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