Original Article

Fast food intake and prevalence of obesity in school children in Riyadh City

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ABSTRACT

Childhood obesity has become a new challenge for healthcare providers. The issue is not limited to certain parts of the world; its prevalence is increasing worldwide. The causes of obesity are poorly understood and continue to be debated and studied. It is a multifactorial disorder which involves dietary, behavioral, environmental as well as genetic factors. The increased consumption of more energy-dense, nutrient-poor foods with high levels of sugar and saturated fats, combined with reduced physical activity, have led to high obesity rates among children. The aim of this study was to assess the effect of dietary intake on the occurrence of childhood obesity, and study other associated factors including the education, occupation and income of parents and the living status. Normal healthy school girls (n =196) and school boys (n = 85) between the age of 6- 15 were recruited for the study. We found that obesity among children in Riyadh City was significantly associated with fast food intake (p = 0.0280). It was also observed that 72.5% of the overweight or obese students consumed fast food at least 4 times/week, and the other 15.9% were taking fast food 1- 3 times/week, while only 11.6% of the same overweight or obese group did not consume any fast food/ week. Father's and mother's occupations were not significantly correlated to their children's body weight. The prevalence of childhood obesity is changing and increasing yearly and is attributed to the nutritional risk factors for the Saudi school-age children. It is interesting to know that most of overweight or obese school students belonged to the families of highincome. Parents must take necessary precautions for the diet of their children and should adopt healthy life style in order to prevent or manage obesity of their children.

Key words:

Body mass index; Fast food; Obesity; Overweight; Riyadh; School children.

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INTRODUCTION

Childhood obesity has more than doubled in children and quadrupled in adolescents in the past 30 years. The percentage of children aged 6–11 years in the United States who were obese increased from 7% in 1980 to nearly 18% in 2012. Similarly, the percentage of adolescents aged 12–19 years who were obese increased from 5% to nearly 21% over the same period. In 2012, more than one third of children and adolescents were overweight or obese. [1] Overweight is defined as having excess body weight for a particular height from fat, muscle, bone, water, or a combination of these factors [2]. Obesity is defined as having excess body fat [3].

Overweight and obesity are the result of "caloric imbalance"- too few calories expended for the amount of calories consumed - and are affected by various genetic, behavioral, and environmental factors [4]. Childhood obesity has both immediate and long-term effects on health and well-being. Obese youth are more likely to have risk factors for cardiovascular disease, such as high cholesterol or high blood pressure. In a population-based sample of 5 - to 17 year-old children, 70% of obese youth had at least one risk factor for cardiovascular disease[5].

Obese adolescents are more likely to have prediabetes, a condition in which blood glucose levels indicate a high risk for development of diabetes [6]. Children and adolescents who are obese are at greater risk of bone and joint problems, sleep apnea, and social and psychological problems such as stigmatization and poor self-esteem [4]. They are likely to be obese as adults and are therefore more at risk of adult health problems such as heart disease, type 2 diabetes, stroke, several types of cancer, and osteoarthritis [7]. Overweight and obesity are also associated with increased risk for many types of cancer, including cancer of the breast, colon, endometrium, esophagus, kidney, pancreas, gall bladder, thyroid, ovary, cervix, and prostate, as well as multiple myeloma and Hodgkin's lymphoma [8]. Healthy lifestyle habits, including healthy eating and physical activity, can lower the risk of becoming obese and developing related diseases [4].

The dietary and physical activity behaviors of children and adolescents are influenced by many sectors of society, including families, communities, schools, child care settings, medical care providers, faith-based institutions, government agencies, the media, and the food and beverage industries and entertainment industries. Schools play a particularly critical role by establishing a safe and supportive environment through policies and practices that support healthy behaviors. Schools also provide opportunities for students to learn about and practice healthy eating and physical activity.

Generally, a patient with body mass index (BMI) above 30 Kg/m^2 is considered obese. There is a growing concern about the increasing prevalence of childhood obesity worldwide. The aim of this study is to examine the relationship between obesity and socioeconomic status and education of parents as well as to examine the association between obesity and fast food intake.

MATERIAL AND METHODS

This is a cross-sectional study conducted at public schools in Riyadh City, Saudi Arabia. The schools were selected randomly, from different areas that have different socioeconomic status in the city, using a cluster sampling method, classrooms were selected randomly, and all the students in a classroom were invited to participate in the study. Only students, both male and female who brought the signed consent were selected and included. Finally, 196 normal healthy school girls and 85 school boys between the age of 6- 15 years were recruited (Table 1).

Table 1 - Study population

Grade groups	Boys	Girls	Total
Primary	59	95	154
Intermediate& High School	26	101	127
Total	85	196	281

Data were collected through a questionnaire. Anthropometric measurements were recorded during physical examination of the participants. Non Saudi School children and Saudi children above 15 years of age or having any diseases or medical problems were excluded from this study.

Anthropometric measurements

Body Mass Index (BMI): was calculated using the standard formula: BMI=Weight/height^2 Height was measured using a wall-mounted stadiometer and the measurement was recorded to the nearest 0.1 cm, whereas, weight was measured by a beam-balance scale and rounded to the nearest 0.1 kg. After calculation, BMI measurements were plotted on the 2000 growth charts of Centers for Disease Control and Prevention (CDC) for boys and girls. BMI varies with age and sex. The CDC defines underweight as BMI-for-age less than the 5th percentile, childhood obesity as a BMI greater than the 95th percentile (Table 2).

Table 2 - Assessment of overweight and obesity in children and adolescents (2-20 years old)

Percentile		Interpretation
BMI	< 5th	Underweight
BMI	5th - < 85th	Normal weight
BMI	≥85th	Overweight and obese

BMI - Body mass index

Dietary Assessment

The food Frequencies Questionnaire:

"Food Frequencies Questionnaire" included questions regarding food habits. The answers were recorded according to written responses and through telephone interviews. Fast-food intake was categorized as:

≤3 times per week

≥4 times per week

Socio-demographic Data:

The socioeconomic data were recorded to measure their effect on obesity prevalence and the early onset of signs of puberty, data included: mother's education and work, father's education and work, family income, living with parents, living outside Riyadh for the last five years, and the origin of children's families.

Statistical methods:

Data were analyzed by using statistical software package SAS version 9.2 (SAS institute Inc, Cary, NC, USA). Descriptive statistics for all variables were reported. All categorical variables were compared by using the chi-square test. T-test was used to test the differences between the different BMI categories for all the nutritional variables. ANOVA test was used to test the differences between different education

levels, BMI categories or signs of early puberty, and food group variables. The level of significance was assumed at p< 0.05.

RESULTS

The study shows a significant relation between fast food intake and body weight (p=0.0280). The percent of students consuming fast foods three times or less per week was higher among the non-overweight or non-obese group (74%) when compared to the overweight or obese group. Students consuming fast food 13- times/week represented (54%) of selected sample while (20%) did not consume any fast food. It was also observed that (72.5%) of the overweight or obese students consumed fast food at least 4 times/ week, and the rest (15.9%) were taking fast food 1- 3 times/week, while only (11.6%) of the same overweight or obese group did not consume any fast food/week (Figure 1). Fast food consumed by students consisted of: Shawerma, Pizza, or Burger (beef, lamb, or chicken).
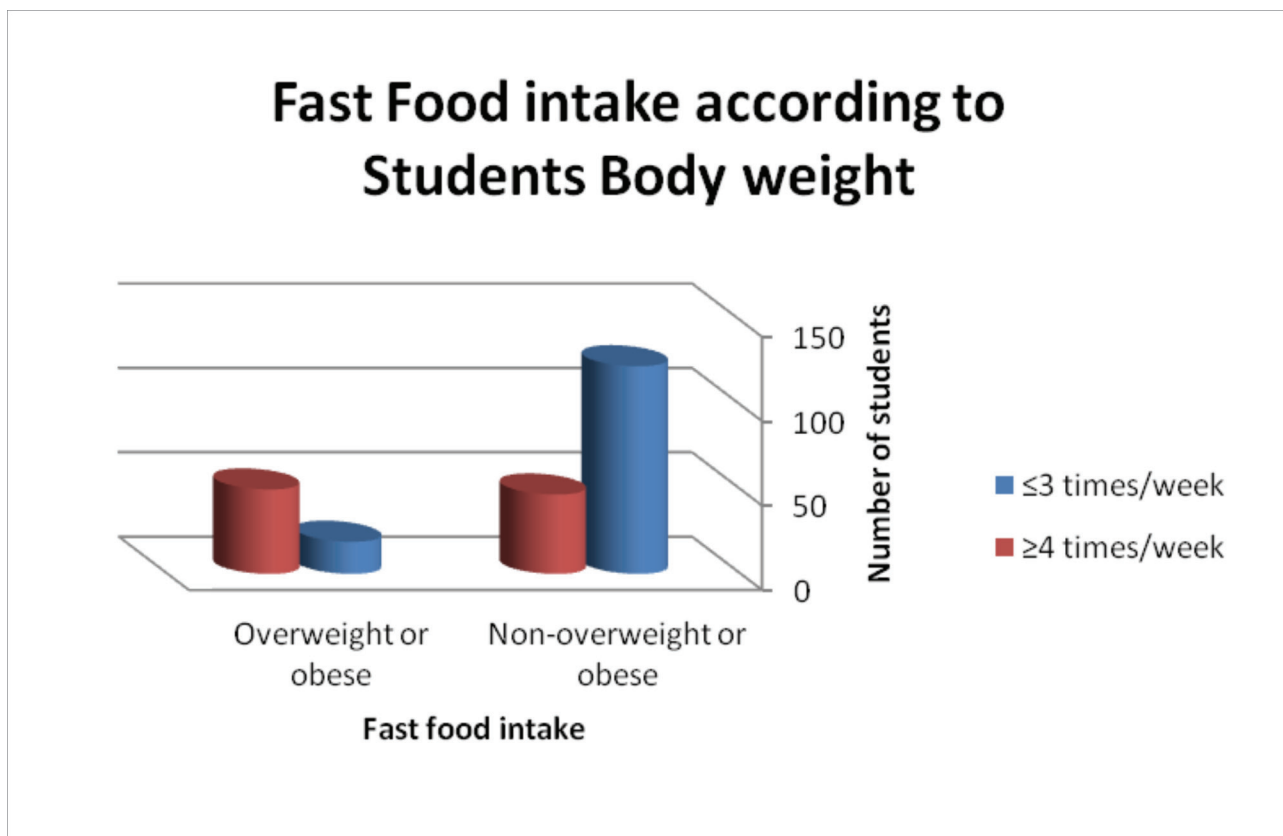

Figure 1 - Fast food intake according to students' body weight (Riyadh)

Table 3 - Distribution of the selected students by body weight and socio-demographic characteristics (Riyadh, 2006)

General Characteristics	Non-overweight or non-obese		overweight or obese		P value
Student level of education	n=170		n=69		0.0098
	N	%	N	%	
Primary	105	61.8	30	43.5	
Intermediate and high school	65	38.2	39	56.5	
Father's level of education	n=180		n=84		0.2762
	N	%	N	%	
Less than University	149	82.8	64	77.1	
University and above	31	17.2	19	22.9	
Mother's Level of Education Less than university University and above	n=178		n=83		0.3632
	N	%	N	%	
	137	77	68	82	
	41	23	15	18	
Father's occupation	n= 182		n= 84		0.2986
	N	%	N	%	
Government	120	66	44	52.4	
Non-Government	33	18	26	31	
Unemployed	29	16	14	16.6	
Mother's Occupation	n= 182		n= 85		0.0870
	N	%	N	%	
Housewife	153	84	64	75.3	
Other (employed/retired)	29	16	21	24.7	
Family income (SR/month)	n=182		n=83		0.3034
	N	%	N	%	
Less than 5,000	43	23.6	12	14.5	
5,000-9,999	43	23.6	17	20.5	
10,000-14,999	22	12	10	12	
15,000 or more	20	11	14	16.9	
Other	54	29.8	30	36.1	
Place of residence	n=182		n=85		0.4544
	N	%	N	%	
Outside Riyadh	7	3.8	5	5.9	
In Riyadh	175	96.2	83	94.1	
Place of Origin Central Region	n=181		n=84		0.2437
	N	%	N	%	
	132	72.9	67	79.8	
Other Region (Southern, Northern, and Western)	49	27.1	17	20.2	
Living with parent	n= 182		n= 85		0.4198
	N	%	N	%	
Yes	177	97.3	84	99	
No	5	2.7	1	1	

N - Numbers, SR - Saudi Rials.

Students' level of education

There was a significant difference in the percentage of Overweight and/or obesity among different students of different level of education (P=0.0098).

The prevalence of being overweight or obesity was higher among intermediate and high school students (56.5%) than primary school students (43.5%) whereas non-overweight or obese school students were more in primary schools (61.8%) than in intermediate & high school (38.2%).

Father's level of education

Results indicate that there were no significant differences for data on father's Level of education with the body weight of students (P=0.2762). The percentage of father's education Less than the university level was more than the university level and above for both Non-Overweight or non-obese and Overweight or obese school students (82.8% vs. 77.1% respectively).

Mothers' level of education

Mother's level of education of most of the Overweight or obese school students (82%) was less than University, compared to Non-overweight or non-obese school students (77%).

Father's occupation

The fathers of non-overweight or non-obese (66%) and Overweight or obese (52.4%) school students worked at the governmental sectors. Whereas (18%) of the Non-overweight or non-obese students, and (31%) of the overweight or obese students had their fathers working in the Non-Governmental sectors. Unemployed Fathers for non-overweight or non-obese school students include retired and deceased (16%), likewise the Ooerweight or obese school students.

Mother's occupation

Most of the Non-overweight or non-obese and overweight or obese students mothers were housewives (84% and 75.3% respectively), compared to 16% of non-overweight or non-obese and 24.7% of overweight or obese students whose mothers have had different types of work or have retired.

Family Income

Approximately29.8% of the families of non-overweight or non-obese students and 36.1% of Overweight or obese students families refused to answer, or did not specify their income (classified as others). It was found that 20.5% of Overweight or obese school student's family income was between 5,000 and 9,999 SAR/month.

Place of Residence

Results for place of residence showed that living outside of Riyadh was not related to the body weight of the students. The vast majority of students were not living outside Riyadh for the last five years; 96.2% of Non-overweight or non-obese and 94.1% of overweight or obese students were living at Riyadh.

Place of origin

About 72.9 %, of the Non-overweight or non-obese students and 80% of overweight or obese students were from the central region of Saudi Arabia. The other groups of students were from the West (1.7%), South (24%) and the North (6%) regions of Saudi Arabia. Regarding the overweight or obese students, 6% of them were from the Western regions and 14.2% from the Southern regions of Saudi Arabia.

Living with Parents

Results indicate that few students (n=6) were not living with their parents, so only (2.7%) of the non-overweight or non-obese school students, and (1%) of the Overweight or obese school students were from this group, while (97.3%) of the non-overweight or non-obese school students and (99%) of the

overweight or obese school students were living with their parents.

DISCUSSION

Obesity among school children is a growing concern. A number of factors contribute to childhood obesity. The most common among those factors are genetic factors, lack of physical activity, unhealthy eating patterns, or a combination of these factors. Only in few cases, being overweight or obese, is caused by a medical condition such as a hormonal problem. A physical examination and relevant laboratory tests can rule out the possibility of a medical condition as the cause of obesity.

Body Mass Index is an appropriate screening test to identify children who should have further evaluation and follow-up, but it is not diagnostic of level of adiposity. A large study comprised of 19,617 subjects from Ireland showed an overall prevalence of obesity among 23% boys and 28% girls aged 4- 16 years [9]. This rate was considerably higher than the report done in Kenya with 15.5% obesity rate [10] Childhood obesity in Thailand has been reported to be 5.8% to 7.9% [11]. Furthermore, according to WHO, Obesity and Overweight Fact Sheet, more than 40 million children under the age of five were overweight in 2011 [12]. In the USA, based on the NHANES (National Health and Nutrition Examination Survey) report, there is an increase in overall prevalence of obesity by more than 300% since in 1976 and over 70% since NHANES III in 1994 among children aged 219- years old [13]. Studies conducted among the Arab population and among Middle Eastern countries showed 47% obesity rates among Lebanese adults [14], 44.4% among Kuwaiti boys [15], 13.7% among UAE children [16], and 7.9% among Qatari children [17].

Obesity and overweight constitute an important health problem affecting a proportion of Saudi population. A study was conducted in Jeddah, where the researchers analyzed data between 1994- 2000 for school children and adolescents aged 10- 20, a significant increase was found in the average BMI for both sexes between 1994 and 2000 on the 50th percentile but even higher on the 85th and 95th percentile, the increase in body weight and BMI were marked for all age groups; however boys showed the largest increase at an age of 1016- years and girls showed the lowest at age 14- 16 years [18].

In this study, most of the intermediate & high school students were non-overweight or obese (62.5%) compared to 37.5% of them who were Overweight or obese. Also the incidence of overweight or obesity among Primary school students (22.2%) was lower than non-overweight or obese school students (77.8%) while the prevalence of overweight or obesity (28.9%) among the school students was significantly different in relation to the different levels of education, overweight or obesity was higher among intermediate & high school students (56.5%) than primary school students (43.5%), The prevalence of overweight and obesity obtained in this study (28.9%) is considered relatively low compared to previous studies.

Father's and mother's level of education was not correlated with the prevalence of overweight or obesity in our study. Most overweight or obese school students (77.1% and 82%) belonged to the parents who had low level of education (less than University). The situation of obesity when compared with mothers' level of education was that obesity was higher (33.2%) among students with mothers' level of education of "less than university" compared with obesity prevalence of 26.8% for students with mothers' education level of "University and above". Another study conducted in university female students in United Arab Emirates showed that there is no significant association between obesity and mother education [19]. A recent study conducted in Iran at rural residents found that high maternal education is a

risk factor of overweight [20].

Regarding the father's occupation, this study shows that the highest prevalence (52.4%) of obesity and overweight was found among school children's whose fathers worked in the governmental sectors, and prevalence of 75.3% for those whose mothers were Housewives. However, the prevalence of obesity among students whose fathers were working for the non-government sectors (44.1%) followed by those whose fathers were unemployed (32.6%). The study on Kuwaiti elementary male school children showed that, the Unemployment of father was significantly associated with overweight and obesity prevalence. However, in our study the prevalence of obesity was 16.6% for the students whose fathers were unemployed [21].

In the USA, the obesity prevalence among low-income, preschool aged children increased steadily from 12.4% in 1998 to 14.5% in 2003, but subsequently remained essentially the same, with 14.6% prevalence [1]. Individuals who have completed a higher grade in school are more likely to follow dietary recommendations and to change their behavior to avoid risks compared to the individuals who have a lower level of education. However, the advantages associated with proper nutrition knowledge seem to be limited [22].

A study was conducted in Saudi Arabia to examine the relationship of socioeconomic characteristics and the prevalence of overweight and obesity; multiple logistic regression analysis showed that age, residential area, region, income, gender, and level of education were statistically significant predictors of obesity. [23]. Our study showed that, the overweight or being obese is more prevalent in school children whose family had an income of 5,0009,999- SR/month. Our results are more or less similar to previous study which concludes that the prevalence of overweight and obesity is high in high family income situations [24]. However, looking into the prevalence of obesity within each income categories in our study would give a different insight to the results, for instant, prevalence within the students whose families' income is SR 15,000 and more was26.4% (14 students out of 53). Similarly, for the group of SR 5,000 to 9,999 the prevalence was 32%, it was 18.9% for the income group of 10,000 to 14,999SR, and 22.6% for the income group of less than SR 5,000.

El-hazmi and Warsy et al [25] determined the prevalence of overweight and obesity in different regions of Saudi Arabia and showed that it was highest among the females in Central Province and Western Province. Other study among male school students in Saudi Arabia, indicated a significant variation in the regional distribution of overweight and obesity (P<0.01); the highest prevalence (18%) was recorded in Riyadh and the lowest was in Sabea (11.1%) located in the Southern region [26]. Furthermore, another study in Saudi Arabia showed that, the prevalence of obesity was more in women than men, while the prevalence of overweight was more among males compared to females while the obesity was present in all age groups. Our study showed that 80% of the overweight and obese school students were from Central region and 20% from other (Northern, Southern, or Western) [28].

High intake of fast food was significantly higher among overweight or obese school children. In our study, 72.5% of them were taking fast food ≥4 times per week, some of them were taking fast food daily as a morning snack (in school), lunch, or at dinner. While 72.4% of non-overweight school students were taking fast food ≤3 times per week, some may take it once per month. In a study of male primary school students in Al Ehssa, KSA, the frequent consumption of fast foods was recognized as a predictor of obesity and overweight among the included male school children [28]. Similar to our study, other studies also found that fast food intake had a significant association with obesity in girls of Dubai-United Arab Emirates. [29].

CONCLUSION

The prevalence of childhood obesity is changing and increasing yearly and is attributed to the nutritional risk factors for the Saudi school-age children. There is significant difference between male and female school students where females outnumbered the male students both at primary and secondary schools. There is a significant correlation between the prevalence of overweight or obesity and level of education where overweight and/or obesity among the primary school students level (although it was high) was lower as compared to the Intermediate and High school students. Most fathers and Mothers of school students in our study had less than University level of education, Nevertheless Fathers and mother's occupations were not significantly correlated to their children's body weight. It is interesting to know that most of the overweight or obese school students belonged to the families of highincome. Parents must take necessary precautions for the diet of their children and should adopt healthy life style. The government and media should also play their role in creating awareness for healthy meals and the risk factors associated with obesity.

LIMITATIONS OF THE STUDY

The 24-hours dietary recalls were taken by phone; it was difficult to have data from all participants due to unanswered phone calls.

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