Prevalence of Overweight and Obesity Among Students of Intermediate Schools in Basrah: A Cross-sectional Study

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ABSTRACT

Background: Obesity is one of the most serious public health challenges of the 21st century and represents a serious health problem for low- and middle-income countries, particularly in urban settings. Its prevalence has increased at an alarming rate. Globally, more than 340 million children and adolescents aged 5–19 years are overweight or obese, and approximately two-third of them live in developing countries. **Aim**: The present study was implemented to assess the prevalence rates of overweight and obesity among adolescents in intermediate schools in Basrah, Iraq. **Methods**: A cross-sectional study was conducted during the second semester (between January 15 and May 30, 2013) among children attending public and private secondary schools in Basra city to determine the relationship between certain variables and the prevalence of overweight and obesity. **Results**: According to the study findings, the overall prevalence rates of overweight and obesity among adolescents aged 13–15 years in intermediate schools were 20.6% and 22.6%, respectively. **Conclusions**: A combination of decreased physical activity, sedentary behaviors (watching TV, playing video games, and using the internet), ingestion of unhealthy foods, and consumption of soft drinks may be responsible for the observed increased prevalence of overweight and obesity among adolescent students in Basra city.

Keywords: Obesity, Basrah, BMI, Cross-sectional Study, Sociodemographic Features, Prevalence

INTRODUCTION

Over the last few decades, there has been a transition from communicable diseases to non-communicable diseases. The global prevalence of childhood obesity has increased at an alarming rate. Over 340 million children and adolescents aged 5–19 years are overweight or obese,[1] which are associated with a greater risk of health problems.[2]

High rates of overweight and obesity among schoolchildren are prevalent within the Arabian Gulf States. Studies have observed the prevalence of obesity to be 14.6% in Kuwait; in Bahrain, it was 21% and 35% in males and females, respectively; in Qatar, it was 28.6% among boys and 18.6% among girls; and in Saudi Arabia, it was 43.6% and 34.8% in males and females, respectively.[4-7]

According to the World Health Organization (WHO), overweight and obesity are defined as an abnormal or excessive fat accumulation that may impair (or pose a risk to) health. For reference, WHO developed the Growth Reference Data for individuals aged 5–19 years.[3]

Additionally, overweight and obesity are linked to various behavioral factors such as consumption of fast-food[4] and soft drinks,[5] physical inactivity,[6] and screen time. Genetics is also reported to play a role.[7]

The development of overweight or obesity in childhood and adolescence is related to subsequent overweight or obesity and an increased risk of morbidity and mortality in adulthood.[8]

The current epidemic of obesity is expected to pose a significant threat to health care systems already struggling with escalating costs. Overweight and obesity are risk factors for many health problems, regardless of age. Children and adolescents who are overweight and obese face a greater risk of health problems, including type 2 diabetes mellitus, high blood pressure, high serum lipids, asthma, sleep apnea, orthopedic problems, and psychosocial problems compared to their peers with moderate weight.[3]

Objective of the study

To estimate the prevalence rates of overweight and obesity among adolescents in intermediate schools in Basrah.

MATERIALS AND METHODS

The paper presents an intermediate school–based cross sectional study conducted to measure the prevalence of overweight and obesity among children in educational levels 7, 8, and 9. The study was conducted from January 15 to May 30, 2013 on a sample of children attending public and private intermediate schools in Basrah city.

Cluster sampling was used in two successive stages: first, the city was divided into three socioeconomic states (low, middle, and high), and the number of schools were selected proportionally from each socioeconomic class. Second, the number of students needed in proportion to the number of educational levels in each school was calculated. A multistage stratified random sampling procedure was used to select the subjects.

The schools were grouped into boys' and girls' secondary schools. At the second stage, classes were selected for each educational level (levels 7, 8, and 9).

Children were excluded if they had a prior major illness, including type 1 or 2 diabetes, or received medications or had a condition known to influence body composition, insulin action, or insulin secretion (e.g., glucocorticoids therapy, hypothyroidism, and Cushing's disease).

Pupils who did not meet the age requirement of 13–15 years were excluded from the study.

The resulting sample size included 727 participants based on a standard formula:[9]

$$N = \frac{Z^2 \times p(1-p)}{d^2}$$

where

N = sample size

Z = statistics for level of confidence of 95% = 1.96

p = expected prevalence or proportion estimated from previous studies, equaling 0.5

d = precision (in proportion of one; if 5%, d = 0.05)

To calculate the 95% confidence interval for an expected prevalence of 3.4% (based on the average percentage prevalence of overweight and obesity in Erbil city)[10] and a margin of error (d) of not more than 0.02, the required sample size was 525. To account for nonparticipation, the sample size was enlarged to 727.

The weight and height of participants were measured using standard procedures. Weight was measured to the nearest 0.1 kg using an electronic portable scale (Seca). To ensure accuracy, the scale was checked for zero reading before each weighing and calibrated with a known weight on the morning of each data collection. The students' heights were measured, in the standing position without shoes, to the nearest 0.1 cm using a portable height scale (Seca). The Body mass index (BMI) was calculated from these measurements.

The BMI was computed for each age and sex, and cut-offs for age according to the WHO criteria were used.[11]

Overweight: >+1SD (equivalent to BMI 25 kg/m2 at 19 years)

Obesity: >+2SD (Equivalent to BMI 30 kg/m2 at 19 years)

Thinness: <-2SD

Severe thinness: <-3SD

The most challenging aspect of BMI is its calculation from height and weight measurements and determination of the BMI percentile, It takes more time with each student.[12]

The questionnaire was explained to the students; afterwards, they completed the questionnaire in their classrooms under the supervision of their teachers and the researchers. The questionnaire included demographic information about the pupil and a specific set of questions regarding the subject of the study, including physical activity, nutrition, and family history.

The questionnaire was a modification of those used in previous studies and was validated via a pilot stage of the study; the modification was necessary to ensure it was more applicable to school pupils.

Simple descriptive statistics (frequency, mean, standard deviation, and percentage) were measured. Data was

analyzed using SPSS (Statistical Package for Social Sciences) version 16.0. Significance was calculated using chi-square, and logistic regression analysis was conducted.

Body mass index (BMI)—the weight in kilograms divided by the square of the height in meters (kg/m2)—is a commonly used index to classify overweight and obesity in adults. WHO defines overweight as a BMI equal to or more than 25 and obesity as a BMI equal to or more than 30.

RESULTS

This study involved 727 pupils in Basra governorate schools; the total number of female participants was 364 (50.1%), while the total number of males was 363 (49.9%). The age range was 13–15 years with a mean age of 14.05 ± .824. The mean and standard deviation of anthropometric measurements for the studied pupils were as follows: Weight, 58.6 kg $\pm$ 17.6 kg; Height, 161.5 cm $\pm$ 14.2 cm; and BMI, 22.4 kg/m^2 $\pm$ 6.2 kg/m^2.

There were 14 (1.9%) severely thin, 33 (4.5%) thin, 366 (50.3%) normal weight, 150 (20.6%) overweight, and 164 (22.6%) obese pupils in the study. The anthropometric measurements were uniformly distributed in the three classes being studied (p value = 0.285).

The results showed no significant difference in the prevalence of overweight and obesity with regard to gender. The number of overweight males was 71 (19.6%) and that of females was 79 (21.7%); the number of obese males was 68 (18.70%) and that of females was 96 (26.40%); thus, there was no statistically significant association between overweight and obesity prevalence and gender (Table 1).

However, the study did reveal a significant relationship between the prevalence of overweight and obesity and the residence of the students (Table 2).

In contrast, there was no significant difference in the prevalence of overweight and obesity between the different school types (Table 3).

A highly significant association was found (P value < 0.001) between the prevalence of overweight and obesity and level of activity (Table 4).

A highly significant relationship was also found between the distribution of BMI values and the time per hour spent on screen (Table 5).

Similarly, significant association was found between the prevalence of overweight and obesity and the number of times the participants ate fast-food per week. The prevalence of overweight and obesity was high in those who ate more than three times per week (Table 6).

However, the results of this study show that the number of times the participants ate sweet per week had no significant relationship to the prevalence of overweight and obesity (Table 7).

The number of times the pupils drank soft drinks per week was similarly not significantly linked to BMI classes (Table 8).

The studied risk factors are ordered according to the magnitude of odds ratio using logistic regression model as shown in Table 9.

DISCUSSION

In the present study, the prevalence of overweight and obesity was 150 (20.6%) and 164 pupils (22.6%), respectively. This is higher than estimates in Erbil (3.4%) were obese and Kuwait (14.6%) were obese .[13] However, it is slightly lower than estimates in Saudi Arabia (23.1%)were obese.[14] In Jordan, 17.5% were overweight and 9.6% were obese,[15] and in Egypt, overweight children constituted 22%.[16]

A study in Iran showed that the prevalence of overweight in boys and girls was 6.2% and 8.7%, respectively and that of obesity among boys and girls was similar (3.3%).[17] The logistic regression analysis showing the prevalence of overweight and obesity according to the age of the pupils in the studied sample was not significant (Table 9).

The results showed no significant relationship between the prevalence of overweight and obesity and gender; in contrast, a study conducted in Erbil city revealed that gender was significantly associated with the prevalence of overweight.[15]

On the other hand, the overall prevalence of overweight and obesity among males in Kuwait was 30.0% and 14.7%, respectively. Also, the overall prevalence of overweight and obesity among females was 31.8% and 13.1%, respectively. The overall prevalence of overweight was lower in males than in females, but that of obesity was higher in males than in females.[18]

A Saudi study detected significant differences between males and females for age, weight, height, BMI, WC, and the combined prevalence of overweight and obesity.[7]

The distribution of BMI classes for the pupils in this sample according to which type of school they were attending showed no significant difference.

These findings differ from that obtained in Saudi where adolescents in private schools had higher odds of being

overweight or obese compared to those in public schools.[7] In an Indian study, the prevalence of obesity was found to be higher in children studying in private schools (4.51%) compared to government schools (1.28%); however, the prevalence of overweight was found to be higher in government school children.[18] In contrast, the results of a univariate analysis carried out in a study in Pakistan showed that there were no statistically significant differences in the rates of obesity between students in private and government schools.[19]

Our result agrees with that of a study among Saudi adolescents, which reported that, compared with non-obese adolescents, obese males and females were significantly less active, especially in terms of vigorous activity.[7] Lack of physical activity also proved to be associated with obesity in Kuwait[18] and Iran.[20]

Regarding the distribution of BMI values for the pupils studied in this sample according to the time (in hours) they spend on screen, there was a highly significant relationship. However, this conclusion disagrees with that of a study in Saudi Arabia.[7]

In this study, the prevalence of overweight and obesity was high in those who eat more than 3 times per week. This result is similar to that reported in a study among Saudi adolescents in which the risk of being obese was greater for those who consumed chocolates and sweets and fast foods more than three times a week;[21] in contrast another study in al-Riyadh city showed there was no statistical difference between high caloric diet ingestion (soft drinks, fast food, and sweet diet) among obese and non-obese adolescents.[22]

Our result agrees with that of a study in UAE that reported a significant association between ingestion of fast foods and obesity in girls, but not in boys;[24] similarly, in Tehran, high intakes of fast foods were significantly associated with overweight and obesity.[23]

The results of this study showed that the number of times sweet was eaten per week had no significant relationship with the prevalence of overweight and obesity among pupils. This agreed with Erbil study, which indicated that there was no significant association between weight status and eating crackers, and only a small proportion (1.6%, 6) of those overweight were eating crackers.[15] However, a study in Bahrain reported a significant association between the prevalence of overweight and obesity and eating sweet.[24]

Furthermore, this study found that there is a significant association between number of soft drinks consumed per week and the prevalence of overweight and obesity. This conclusion varies from that of an Erbil study whose result revealed that there was no significant association between weight status and daily intake of soft drinks, and although 6.2% (14) drank soft drinks daily and were overweight, 3.6% (8) did not drink soft drinks daily but were overweight.[15]

CONCLUSIONS

In this study, the overall prevalence of overweight and obesity among adolescents aged 13–15 years in intermediate schools was 20.6% and 22.6%, respectively. Furthermore, the prevalence of overweight and obesity in Basrah city children is higher than that in many other parts of Iraq and some neighboring countries. A combination of decreased physical activity, sedentary behaviors (watching TV, playing video games, and using the internet), ingestion of unhealthy foods, and consumption of soft drink may be responsible for the increase in the prevalence of overweight and obesity among adolescent students in Basrah city. Measures should be implemented to prevent further increase in the number of overweight school-age children and adolescents and the associated health hazards. It is recommended that regular exercise and a decrease in sedentary activities should be encouraged in children to reduce the rising trend of overweight and obesity in Basrah city. Health education programs may be sought via the media to tackle this problem.

Table 1: Prevalence of overweight and obesity according to gender.

Gender	BMI classification											Sig.
	Severe thinness		Thinness		Normal		Overweight		Obesity		TOTAL		
Male	6	1.70%	19	5.20%	199	54.80%	71	19.60%	68	18.70%	363	100%	X^2= 9.047 df=4 p= 0.060
Female	8	2.20%	14	3.80%	167	45.90%	79	21.70%	96	26.40%	364	100%	

Table 2: Prevalence of overweight and obesity according to residence.

	Severe thinness		Thinness		Normal		Overweight		Obesity		Sig.
Low	9	1.60%	13	2.30%	99	17.4%	54	9.50%	45	7.90%	
Middle	0	0.00%	8	1.40%	133	24.4%	48	8.50%	59	10.4%	X^2= 21.485 df=8 p=0.006
High	0	0.00%	2	0.40%	52	9.20%	23	4.00%	23	4.00%	

Table 3: Prevalence of overweight and obesity according to school type.

School type	BMI classification											Sig.
	Severe thinness		Thinness		Normal		Overweight		Obesity		Total		
Public	9	1.60%	23	4.10%	284	50.10%	124	21.90%	127	22.40%	567	100%	x^2=4.828 df=4 p=0.305
Private	5	3.10%	10	6.20%	82	51.20%	26	16.20%	37	23.10%	160	100%	

Table 4: Prevalence of overweight and obesity according to physical activity.

Physical activity	BMI classification					Total	Sig.
	Severe thinness	Thinness	Normal	Overweight	Obesity		
Active	12 2.9%	25 6.0%	293 70.8%	46 11.1%	38 9.2%	414 100.0%	x^2 =35.992 df=16 p=0.003
Inactive	2 0.6%	8 2.6%	73 23.3%	104 33.2%	126 40.3%	313 100.0%	

Table 5: Prevalence of overweight and obesity according to screen time.

Screen time Hours/day	BMI classification											Sig.
	Severe thinness		Thinness		Normal		Overweight		Obesity		Total		
<Two	5	0.70%	9	1.20%	86	11.80%	28	3.90%	13	1.80%	141	19.40%	x^2 =21.483 df=4 p<0.001
>Two	9	1.20%	24	3.30%	280	38.50%	122	16.80%	151	20.80%	586	80.60%	

Table 6: Prevalence of overweight and obesity according to consumption of fast food.

No. of times fast food was eaten/week	BMI classification					Total	Sig
	Severe thinness	Thinness	Normal	Overweight	Obesity		
Less than three	9 2.5%	17 4.7%	208 57.3%	65 17.9%	64 17.6%	363 100.0%	x^2=18.572 df=4 P=0.001
More than three	5 1.4%	16 4.4%	158 43.4%	85 23.4%	100 27.5%	364 100.0%	

Table 7: Prevalence of overweight and obesity according to eating sweet.

No. of times sweet was eaten per week	Severe thinness		Thinness		Normal		Overweight		Obesity		Total		Sig.
Twice or less	6	42.90%	11	33.30%	126	34.40%	40	26.70%	38	23.20%	221	30.40%	x^2= 10.411 df=8 p=0.237
Three to five times	5	35.70%	10	30.30%	100	27.30%	45	27.30%	51	30.00%	211	31.10%	
Six times and more	3	21.40%	12	36.40%	140	38.30%	65	38.30%	75	43.30%	295	45.70%	

Table 8: Prevalence of overweight and obesity according to consumption of soft drink.

Number of soft drinks consumed/week	BMI classification					Total	Sig.
	Severe thinness	Thinness	Normal	Overweight	Obesity		
Less than 3	6 1.6%	9 2.4%	194 51.1%	72 18.9%	99 26.1%	380 100.0% 52.3%	$x^2$14.24 df=4 p=0.007
More than 3	8 2.3%	24 6.9%	172 49.6%	78 22.5%	65 18.7%	347 100.0%	

Table 9: Logistic regression analysis.

Variables	B	Sig.	Exp(B)
Age	0.268	.063	1.307
Gender	0.587	.014	1.799
Screen viewing time	1.149	<0.001	3.156
Fast food times per week	1.101	<0.001	3.007
Eating sweet times per week	0.147	0.291	1.158
Residence	-0.327	0.052	0.721
Soft drink	-0.621	0.041	0.537
Physical activity	3.301	<0.001	27.131

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