Overweight and Obesity in A Sample of Primary School Children in Baghdad

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ABSTRACT:

BACKGROUND:

Obesity is one of the most serious public health problems of the 21st century, that has many serious long-term consequences for health**.** The prevalence of childhood obesity has been increasing at worrying rates across the globe.

OBJECTIVE:

To measure the prevalence and identify potential risk factors of overweight and obesity among a sample of primary school children in Baghdad, Iraq.

METHODS:

This cross-sectional study was conducted on a random sample of 10 primary schools from different localities of Baghdad, followed by a systematic random sample of 620 children aged 10 years or more of both sexes. A questionnaire sent to the parents to gather information on socio-demographic characteristics, dietary habits, daily physical activity, steroids use, family history of obesity and parents` education and job. Children's height (cm), weight (Kg), and BMI-for-age were measured and parents` height and weight were obtained through a questionnaire sent to the parents and accordingly BMI (Kg/m^2) was calculated. Child's weight status was categorized based on WHO 2007 Growth Reference.

RESULTS:

The prevalence of high BMI was 30.3%, including 16.3% overweight and 14% obesity. Following application of binary analysis, the significant risk factors included in the logistic regression model that revealed the following significant risk factors: not having regular sports (OR: 4.1; P=0.000), child inactivity (OR: 3.1; P=0.001), high meal frequency (OR: 2.6; P=0.006), positive family history of obesity (OR: 2.5; P=0.01) and more sweets and bicarbonate beverages (OR: 2.2, P=0.002).

CONCLUSION:

The prevalence of overweight/obesity was high among primary school children. Children should be considered the priority population for intervention strategies and to combat early childhood obesity.

KEYWORDS: overweight, obesity, primary school children.

INTRODUCTION:

Obesity is one of the most serious public health problems of the 21st century that is characterized by abnormal or excessive fat accumulation in the body that may impair health [1].

Obesity has many serious long-term consequences for health. Beside emotional and psychological problems, childhood obesity can lead to life-threatening conditions including diabetes, high blood pressure, heart disease, cancer, and other disorders like liver disease, early puberty or menarche, sleep problems, skin infection, and asthma [2].

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The prevalence of childhood obesity has been increasing at worrying rates across the globe. In addition to striking the developed world, this pattern has also been noted in developing countries undergoing rapid epidemiological transitions, including those in Eastern Mediterranean Region (EMR) [3]. Different Iraqi studies were directed to measure the overweight/obesity prevalence among primary school children and showed a rapid increase in prevalence of overweight and obesity in our society [4-6].

According to WHO, currently 10% of children worldwide are either overweight or obese More than 40 million school children were overweight or obese in the EMR in 2010. EMR countries are the second in the world after the Americans and

exceed European countries in prevalence of overweight and obesity [3].

Body mass index (BMI) defined as a person's weight in kilograms divided by the square of his height in meters (kg/m^2) is a simple index that commonly used to classify overweight and obesity in adults [7]. For children and teens, the amount of body fat changes with age and differs between girls and boys, so the BMI age- and sex-specific percentiles are used and called BMI-for-age [8-10].

The objective of this study was to measure the prevalence and identify potential risk factors of overweight/obesity among a sample of primary school children in Baghdad, Iraq.

METHODS:

Study Design and Setting: A descriptive cross sectional study was conducted in 10 primary schools in different localities of Baghdad, 2014.

Sampling Technique and Sample size: The 10 schools were selected by simple random sampling using a list of all primary schools in Baghdad. A systematic random sample was applied later to select the students aged 10-15 years of both sexes using the students list of each school.

For estimation the sample size, the following equation is used: $\mathbf{N= Z^2 *P (1-P)/d^2}$ [11], Where N=sample size, Z= 1.96, d=precision estimated to be (0.04) and P=estimated prevalence of overweight\obesity. We used the prevalence of overweight/Obesity reported from the Nutrition Research Institute study, Iraq, 2010 [4], which were 27.5%. The estimated necessary sample size was 480, and it was agreed to engage 620 students to increase the power and to compensate for non-response.

Data Collection Tool: A structured questionnaire was developed and consisted of two parts: Part 1: included demographic data (sex, age, and class) and measuring of height (in cm) and (weight in kg) to calculate the BMI.

Height was measured without shoes to the nearest 0.1 cm using a portable stadiometer. Weight was measured in light clothing to the nearest 0.1 kg using a well-calibrated digital scale. BMI was calculated as the ratio of weight (kg) to height (m) squared (kg/m^2).

Child weight status categorized based on the 15th, 85th, and 97th percentiles; these percentiles were recommended BMI-for-age cut-off points according to the WHO 2007 Growth Reference [9-10].

Part 2: filled by parents and included questions on the dietary habits including: meal frequency, having regular breakfast, consumption of sweets and bicarbonate beverages, physical activity patterns (according to parents' opinion), having regular sports, average time spent on watching TV and playing videogames, steroids use, parents` weight and height, and parents` education and job.

Statistical analysis: Statistical Package for Social Sciences (SPSS v.18) used for data entry and analysis. Chi square test applied to test association between categorical data. Logistic regression analysis applied to identify the significant independent risk factors. The level of significance was set at P value of ≤ 0.05.

Official approval and ethical consideration: Approvals from Iraq Ministry of Education was granted**.** Verbal consent was obtained from schools' principals and the parents. All information was kept anonymous.

RESULTS:

The study sample composed of 620 primary school children; but only 502 (81%) brought back the parents' questionnaire. Females constituted 52.4% (325).

The prevalence of high BMI-for-age was 30.3%, and this was comprised of 16.3% in the overweight category and 14% in the obesity category. (Figure 1).

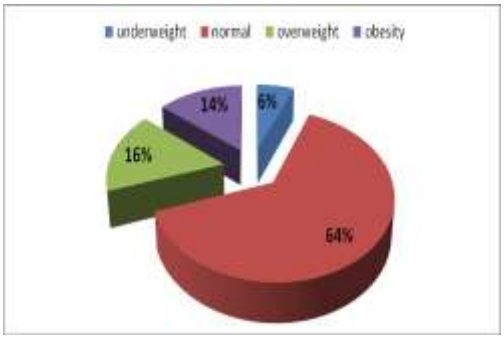

Figure 1: BMI categories proportion of study group.

Comparing the group with high BMI-for-age with other categories revealed that the prevalence among females was 32% compared to 28.5% among males (P=0.340). Similarly, the prevalence of high BMI-for-age was not significantly higher among those aged >11 years compared to those aged ≤11 years (P=0.294) (Table 1). The high BMI-for-age was not significantly associated with parents` education or job (P>0.05).

Table 1:Distribution of the study group by gender and age in relation to BMI-for-age.

		BMI for age						P-value
		Underweight/ Normal		Overweight/ Obesity		Total		
Variable	Category	N(432)	69.7%	N(188)	30.3%	N(620)	%	
Gender	Male	211	71.5	84	28.5	295	47.6	0.340
	Female	221	68	104	32	325	52.4	
Age (year)	≤ 11	254	71.4	102	28.6	356	57.4	0.294
	≥ 12	178	67.4	86	32.6	264	42.6	

The prevalence of high BMI-for-age was significantly higher among breakfast skippers (38.7% vs 28.3%; P=0.019), those consuming more than three meals daily (53% vs 20.6%; P=0.006) and those consumed sweets and bicarbonate beverages more than two times/day (45.4% vs 19.8%; P=0.001) (Table 2)

The distribution of high BMI-for-age with physical activity patterns revealed a significantly higher high BMI for age among the inactive group (as described by their parents) (67.2% vs 18%; P=0.004), children with no regular sports (74.6% vs 9.6%; P=0.000) and children spending >2 hours per day watching TV and playing videogames (36,2% vs 15.7%, P=0.000) (Table 2).

Table 2: Distribution of BMI-for-age by dietary habits and physical activity patterns.

		BMI for age						P-value
		Underweight/ Normal		Overweight/ Obesity		Total		
Variable	Category	N(344)	69.7%	N(158)	30.3%	N(502)	%	
Skipping breakfast	No	249	71.7	98	28.3	347	69.1	0.019
	Yes	95	61.3	60	38.7	155	30.9	
Meal frequency (n/day)	< 3	154	79.4	40	20.6	194	38.6	0.006
	3	159	65.7	83	34.3	242	48.2	
	> 3	31	47	35	53	66	13.2	
Sweets& bicarbonate beverages (n/day)	≤ 1	162	80.2	40	19.8	202	40.2	0.001
	2	105	66	54	34	159	31.7	
	≥ 3	77	54.6	64	45.4	141	28.1	
Child activity	Active	137	82	30	18	167	33.3	0.004
	Normal	188	67.9	89	32.1	277	55.2	
	Inactive	19	32.8	39	67.2	58	11.6	
Having sports	Yes	301	90.4	32	9.6	333	66.3	0.001
	No	43	25.4	126	74.6	169	33.7	
TV-watching & playing videogames (h/day)	< 2	97	84.3	18	15.7	115	22.9	0.001
	2+	247	63.8	140	36.2	387	77.1	

The prevalence of high BMI-for-age was significantly higher among children using steroid medication (48.8% vs 29.9%; P=0.020), and those with one or both obese parents (41.1% vs 26.7%; P=0.002). (Table 3)

Table 3:Distribution of BMI-for-age by steroids use, family history of obesity.

		BMI for age						P-value
		Underweight/ Normal		Overweight/ Obesity		Total		
Variable	Category	N(344)	69.7%	N(158)	30.3%	N(502)	%	
Steroids drug History	Yes	21	51.2	20	48.8	41	8.2	0.020
	No	323	70	138	29.9	461	91.8	
Family history of obesity	Negative	261	73.3	95	26.7	356	70.9	0.002
	Positive	86	58.9	60	41.1	146	29.1	

Logistic regression analysis was applied to identify the significant un-confounded risk factors of high BMI-for-age (overweight/obesity) among primary school children. The strongest risk factors were not having regular sports and general physical inactivity, followed by frequent meals, obese parents and consumption of high caloric beverages and sweets. (Table 4)

Table 4: Significant risk factors obtained by Logistic Regression Analysis Model.

Variable	Odds Ratio	P-value
Not having regular sports	4.122	0.001
Child Inactivity	3.314	0.001
High Meal Frequency	2.614	0.006
Having one or both obese parents	2.504	0.01
More Sweet and bicarbonate Beverage	2.246	0.002

DISCUSSION:

In the current study, around one third of primary school children were either overweight or obese. Lower prevalence rates were reported in Babel province, 2002 [5] (19%) and Mosul city, 2007[6] (21.1%). In 2010, the Nutrition Research Institute [4] study on primary school children revealed a prevalence of 19.6% overweight and 7.9% obesity. It is clear that there is a rapid increase in prevalence of overweigh and obesity in our society over time.

In EMR countries, the prevalence of high BMI-for-age among school children in 2011 was ranged from 7% to 45%; the second in the world after the Americas and exceeds European countries [3]. The prevalence was 45.3% in Kuwait and 33.6% in UAE [12]. In Europe2009, the prevalence was lowest in Slovakia (10%), 18.8% in Russia, and highest in Italy (36%) [13]. In USA 2007-2008, the prevalence was 31.7% for overweight and 28.6% for obesity [14].

Females showed a higher prevalence of overweight/obesity than males, although the difference was not statistically significant. This is consistent with previous Iraqi studies carried in Babel [5] and Mosul [6]. Lobstein et al, 2004 [15], found that the prevalence of overweight and obesity by sex in school children do not exhibit the same trend in EMR countries. In countries, such as Bahrain, Egypt, Tunisia, Kuwait, and Qatar, the prevalence was higher among girls than boys. Socio-cultural and environmental factors including dietary habits and physical activity may play a role [15].

The non-significant difference between the two age groups included in the current study might be due to the narrow age range. In USA, the prevalence was higher in the 12 years old children than that in the 10 years old children [14] while in the 13 European Countries study, 2004 [16], the prevalence of overweight in the 15 years old adolescents was lower than that in the 13 years old adolescents. This may be related to the pre and puberty stage which has a significant influence on weight gain [16].

Dietary habits were important risk factors of overweight/obesity among young children [17]. Skipping breakfast was a significant risk factor. This is consistent with a systematic review of 16 studies from Europe found that eating breakfast is associated with a reduced risk of becoming overweight or obese in young children [18]. In contrast to our finding that high meal frequency is an independent risk factor of overweight/obesity, the female adolescents study in US, 2012 [19] concluded that a lower eating frequency predicts a greater BMI and waist circumference in adolescent females. Franko et al, 2008 [20] found no significant effect for meal frequency on overweight. WHO reported that there is insufficient evidence that increased

eating frequency leads to increased or decreased obesity [21]. The number of meals eaten per day gives a clue to the frequency of eating and not to the quality and quantity of food eaten per meal.

The positive association between sweets and bicarbonate beverages consumption and overweight/obesity is consistent with many studies. [22-26]

In the present study, the prevalence of overweight/obesity is positively associated with all indicators of physical inactivity. Similar findings were reported from previous Iraqi studies [27-29] and other studies conducted in the region. [30-32] The time spent watching TV and playing videogames is an important risk factor of overweight/obesity. Many studies conducted to study this particular variable and revealed its importance in increasing children weight through low physical activity and as an advertising source for high calorie diet. [5,33-37]

In the current study; about 8% of study population were on steroids therapy. The positive association with BMI-for-age was consistent Apovian, 2005 study [38] that found steroids medication can increase a child's appetite and over time this increases their risk for obesity and to exacerbation of comorbid conditions related to obesity.

Having one or both obese parents was an important risk factor for overweight/obesity among children. This finding is consistent with studies conducted in other countries [39-41]. Obese children with family history of obesity share the same environmental and dietary pattern, meanwhile genetic factor should not be excluded.

In the present study; the prevalence of overweight/obesity was not associated with both parents` education and parents` job. This indicates that the socio-economic factors have no effect on the prevalence of overweight/obesity. The results from studies in other parts of the world are controversial. Obesity in developing countries is no longer a disease of higher socioeconomic groups, and the burden is even tending to shift towards the low socioeconomic groups. [3, 42-44]

CONCLUSION:

Around one third of school children are overweight or obese. High risk groups were children with more frequent meals, consumption of high calorie diets, child inactivity and parent's obesity. School health services should play a role in prevention and early detection of overweight/obesity through health education, nutrition education, and promotion of physical activity.

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