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Prevalence and determinants of overweight and obesity among public primary school students in AL-Nasiriya city at 2018-2019.

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Abstract

Background: Childhood obesity is a serious public health issues worldwide in the 21st century and the prevalence has been increasing in all countries.
Objectives: To estimate the prevalence of overweight and obesity among primary school students in AL-Nasiriya city and their correlation with the eating habits, socioeconomic and lifestyle factors.
Methods: A cross-sectional study conducted on 357 (177 girls and 180 boys) sample of pupils aged 6-12 years selected randomly from students who attended public primary schools during the period from1st of December 2018 to the end of May 2019 in AL-Nasiriya city. The Body Mass Index (BMI) was measured and used as indicator for overweight/obesity.
Results: The overall prevalence of obesity and overweight among primary school children in AL-Nasiriya city was 28% (17.9% were obese and 10.1% were overweight). A significant positive association between excessive body weight and snacks No./day (p-value=0.004, odd ratio=3.112), and fruits intake (p-value=0.014, odd ratio=2.767) was found in this study. While, there was a significant negative association of student's BMI with the physical activities (p-value=0.049, odd ratio=0.566).
Conclusion: The prevalence of overweight and obesity is relatively high among primary school students in AL-Nasiriya city. Preventive approaches by the families and the schools should be considered.

Keywords: Overweight, Obesity, Primary schools, Nasiriya.

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Introduction

In recent decades, childhood obesity has become more prevalent and predicted to become a major health problem by 2020 according to World Health Organization [1]. The WHO reports show that, childhood obesity is one of the most serious public health challenges of the 21st century, which is steadily expanding in many low income and middle-income countries, especially in urban areas [2].

According to recent global estimates of WHO, the worldwide obesity prevalence tripled between 1975 and 2016 [3]. Under the age of 5 years, 38 million children were overweight or obese in 2019. Half of these children lived in Asia [3,4]. In 2016, among children and adolescents aged 5-19 years, 340 million were overweight or obese [3,5]. The prevalence of overweight and obesity among those aged 5-19 has been increase dramatically from 4% in 1975 to over 18 % in 2016. This increment has occurred equally among boys and girls [3].

The prevalence of overweight and obesity in high socioeconomic status children in India were 16.75% and 5.59% in boys, and 19% and 5% in girls, respectively [6]. In Jordan a study was conducted among school children at 2006 revealed that 19.4% were overweight and 5.6% were obese [7].

In Kuwait at 2010, the prevalence of overweight and obesity among male students aged 6-10 years were 20.2% and 16.8%, respectively [8]. In Iraq, a study was done among primary school students in Basrah city at 2011 was found that 13.6% were overweight and 10.5% were obese [9]. While in Baghdad a study was done at 2013 revealed that 16.7% were overweight and 16.2% were obese [10].

Overweight and obesity defined by using the Body Mass Index (BMI) which calculates as person's weight in Kilograms (kg) divided by square of his height in (meters) [11]. Obesity results from an imbalance between calories consumed and energy expended. The socioeconomic status and family lifestyles have a major impact on the dietary and behavioral choices of children [12].

Bad eating habits like consumption of unhealthy high energy food rich in fat, sugar and salt with low nutritional value, drinking of sweetened beverages and outdoor eating coupled with decline in physical activity and sedentary behaviors like spent more time with screens (televisions, smartphones, and computers) results in excess adiposity and dramatic rise in overweight and obesity prevalence [13]. Inadequate sleep is a risk for weight gain through association with decreased leptin levels and increased ghrelin levels, with increased hunger and appetite [11,14].

Excessive adiposity is a major risk factor for emergence of non-communicable diseases later on such as heart disease, osteoarthritis, and some types of cancers [15,16]. In addition, obese children complain from sleep apnea, high blood pressure,

insulin resistance, hyperlipidemia and phycological problems like depression [3,9].

Excessive body weight and it is associated comorbidities are preventable. Life style modifications like decrease consumption of high energy fast food, choosing healthy diet, engorge regular daily exercise, and limit time spent in sedentary activities are the main steps in the prevention and treatment of this serious health problem [17].

Aims of the Study

This study was carried out to estimate the prevalence of overweight and obesity among primary school children in AL-Nasiriya city and their correlation with the eating habits, socioeconomic and lifestyle factors.

Subjects and Methods

Subjects

This cross-sectional study was carried out on 357 (177 girls and 180 boys) sample of students aged 6 years-12 years selected randomly from students who attended the public primary schools during the period from1st of December 2018 to the end of May 2019 in AL-Nasiriya city.

Four primary schools were recruited for the study, including two schools for boys and two schools for girls. The students selected were healthy with no chronic disease. Children who had diarrhea and children who took steroid drug were excluded from the study.

The data were obtained through a questionnaire designed for this study and include: age of student, sex, parental education that considered as low (primary school or less) and high (secondary schooling or higher), and parental employment [9]. Other questions about dietary habits including number of meals per day 1, 2, 3, eating between meals (snacks) (none, 1, ≥ 2), and eating while watching TV were recorded.

In addition, fruits, dairy products (including cheese, milk, ice cream, yogurt, and butter), soft drinks, chocolate and sweets intake were recorded as number of servings per day.

Other variables that were collected included physical activity (sport in and outside school like football, running, and cycling), way of going to school (by bus or on foot), and sedentary behaviors including sleeping time per day, the number of hours watching TV and playing with smart devices. Screen time for >2 hours per day was considered a risk factor for overweight and obesity [18].

Methods

Weight was measured in kilograms with a well-calibrated digital scale. All pupils were wearing light clothes and were barefooted. Height was measured in centimeters without shoes using a standard measuring tape with an accepted error of 0.1 cm.

For all pupils, the Body Mass Index (BMI) was calculated from the equation: (weight (kg)/height (m2)). According to the BMI, the child determined to be: obese if ≥ 95th percentile, overweight if ≥ 85th percentile to <95th, normal if ≥ 5th percentile to < 85th percentile, underweight if <5th percentile [19].

Body Mass Index (BMI) percentile, was determined using the 2000 “Centers for Disease Control and Prevention” (CDC) Growth Charts for the United States [19].

Ethical aspects

An informed consent was obtained from all students participate in this study and from the school’s managers. An ethical approval was obtained from scientific committee of medical college/university of Thi-Qar, and Thi-Qar health directorate.

Results

This study was carried out on 357 primary school students aged 6-12 years. One hundred seventy-seven (49.6%) were girls with mean age 9.4181 and Std. Deviation 1.60709, and 180 (50.4%) were boys with mean age 9.5861 and std. Deviation 1.66112 (Table 1).

	Gender	N	Mean	Std. Deviation	Mean Difference	Anova	P value
Age	Girls	177	9.4181	1.60709	-0.16803	0.171	0.68
	Boys	180	9.5861	1.66112	-0.16803		
Weight	Girls	177	32.6401	10.30392	-0.11544	2.926	0.088
	Boys	180	32.7556	9.08656	-0.11544		
Height	Girls	177	2.1661	11.32654	0.83416	3.731	0.054
	Boys	180	1.3319	0.09955	0.83416		
BMI	Girls	177	18.5922	4.58206	0.33737	6.524	0.011
	Boys	180	18.2548	3.84534	0.33737		

Table 1. Distribution of age and some growth parameters according to gender.

Figure 1 shows that 64 (17.9%) of students were obese, 36 (10.1%) were overweight, while 231(64.7%) had normal nutritional status.

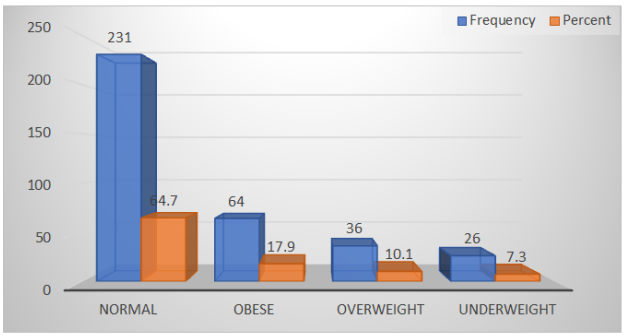

Figure 1. Distribution of primary school children according to BMI.

The prevalence of obesity was higher (20.9%) among girls compared to 15% in boys, while the prevalence of overweight was higher 12.2% in boys compared to 7.9% in girls. These results were statistically insignificant, p-value=0.269.

Increase in father educational level associated with excessive body weight among their children (19.4% were obese, and 12% were overweight) but this result was statistically not significant, p-value 0.540. Also, there was no significant association between mother educational level and pupils' BMI.

No significant association was found between parents' occupation and body weight categories (p=0.913 and p=0.234 for fathers' and mothers' occupation respectively) (Table 2).

		Normal	Obese	Overweight	Under weight	Total	X^2, P value
Gender	Girls	115	37	14	11	177	3.935[a]
		65.00%	20.90%	7.90%	6.20%	49.60%	0.269
	Boys	116	27	22	15	180	
		64.40%	15.00%	12.20%	8.30%	50.40%	
Father education	Low	83	17	7	8	115	
		72.20%	14.80%	6.10%	7.00%	32.20%	5.111, 0.540
	High	148	47	29	18	242	
		61.20%	19.40%	12.00%	7.40%	67.80%	
Mother education	Low	122	32	17	10	181	
		67.40%	17.70%	9.40%	5.50%	100.00%	
	High	109	32	19	16	176	
		61.90%	18.20%	10.80%	9.10%	100.00%	
Father occupation	Employed	194	56	30	22	302	0.525 0.913
		64.20%	18.50%	9.90%	7.30%	84.60%	
	None	37	8	6	4	55	
		67.30%	14.50%	10.90%	7.30%	15.40%	
Mother occupation	Employed	91	21	19	12	143	4.270[a]
		63.60%	14.70%	13.30%	8.40%	40.10%	0.234
	None	140	43	17	14	214	
		65.40%	20.10%	7.90%	6.50%	59.90%	
Total		231	64	36	26	357	
percent		64.70%	17.90%	10.10%	7.30%	100.00%	

Table 2. Association of nutritional status with different socio-demographic characteristics of pupils.

The prevalence of overweight and obesity significantly increased with the increase in number of meals and snacks/day (p=0.048 and p=0.002 respectively). A significant positive association of BMI with the fruits consumption per day was found, p value=0.045. No association was found between dairy products, soft drinks and sweet intake per day with the pupils' BMI, p-value >0.05 (Table 3).

		BMI				Total	FE test, P value
		Normal	obese	overweight	underweight		
Meal No./day	One	3	0	0	0	3	13.832[a]
		100.00%	0.00%	0.00%	0.00%	100.00%	0.048
	Two	22	1	2	6	31	
		71.00%	3.20%	6.50%	19.40%	100.00%	
	Three	206	63	34	20	322	
		63.70%	19.60%	10.60%	6.20%	100.00%	
Snacks No. /day	None	41	4	0	9	54	20.562[a]
		75.90%	7.40%	0.00%	16.70%	100.00%	0.002
	One	81	25	13	9	128	
		63.30%	19.50%	10.20%	7.00%	100.00%	
	Two	109	35	23	8	175	
		62.30%	20.00%	13.10%	4.60%	100.00%	
Dairy product /day	None	54	7	3	3	67	12.179[a]
		80.60%	10.40%	4.50%	4.50%	100.00%	0.058
	1 serving	137	49	24	18	228	
		60.10%	21.50%	10.50%	7.90%	100.00%	
	2 serving	40	8	9	5	62	
		64.50%	12.90%	14.50%	8.10%	100.00%	
Fruits intake/day	None	56	7	9	7	79	12.875[a]
		70.90%	8.90%	11.40%	8.90%	100.00%	0.045
	one	122	32	20	16	190	
		64.20%	16.80%	10.50%	8.40%	100.00%	
	Two	53	25	7	3	88	
		60.20%	28.40%	8.00%	3.40%	100.00%	
Soft drink & sweet/day	None	44	4	3	5	56	10.965
		78.60%	7.10%	5.40%	8.90%	100.00%	0.064
	One	107	30	16	14	167	
		64.10%	18.00%	9.60%	8.40%	100.00%	
	> One	80	30	17	7	134	
		59.70%	22.40%	12.70%	5.20%	100.00%	
Total		231	64	36	26	357	
		64.70%	17.90%	10.10%	7.30%	100.00%	

Table 3. Association of BMI with the dietary habits of primary school children.

The prevalence of overweight among pupils watching TV>2 hr/day was higher (12.9%) compared to 6.5% among those watching TV<2 hr. While obesity was more prevalent among those are watching TV<2 hr. This association was statistically significant, p=0.007. No correlation was found between sleeping time, playing with smart devices, eating while watching TV, and way of going to school with excessive body weight, p-value >0.05 (Table 4).

		Normal	Obese	Overweight	Underweight	Total	FE, P value
TV watching (hours)	>2	136	25	26	15	202	12.088[a]
		67.30%	12.40%	12.90%	7.40%	100.00%	
	<2	95	39	10	11	155	0.007
		61.30%	25.20%	6.50%	7.10%	100.00%	
Mobile (hours)	>2	162	40	18	17	237	6.487
		68.40%	16.90%	7.60%	7.20%	100.00%	0.091
	<2	68	24	18	9	119	
		57.10%	20.20%	15.10%	7.60%	100.00%	
Sleeping (hours)	>8	129	29	19	13	190	2.375, 0.576
		67.90%	15.30%	10.00%	6.80%	100.00%	
	<8	102	35	17	13	167	
		61.10%	21.00%	10.20%	7.80%	100.00%	
Watching and eating	Yes	117	28	12	12	169	4.193[a] 0.241
		69.20%	16.60%	7.10%	7.10%	100.00%	
	No	114	36	24	14	188	
		60.60%	19.10%	12.80%	7.40%	100.00%	
Way of going to school	By foot	138	27	19	17	201	7.346[a], 0.062
		68.70%	13.40%	9.50%	8.50%	100.00%	
	By bus	93	37	17	9	156	
		59.60%	23.70%	10.90%	5.80%	100.00%	
Total		231	64	36	26	357	
		64.70%	17.90%	10.10%	7.30%	100.00%	

Table 4. Relationship of BMI with the behavioral habits of pupils.

A significant negative association was found between physical activity and high BMI among primary school students, p-value=0.026 (Figure 2).

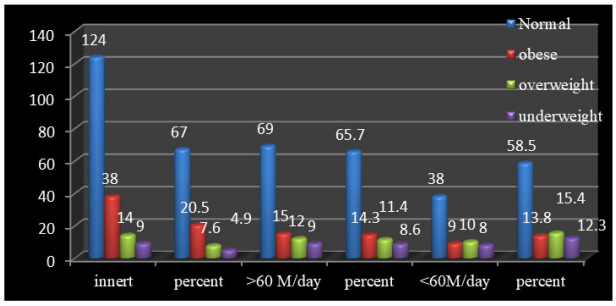

Figure 2. Correlation of nutritional status with the physical exercise

Pea**rson Chi-Square=18.943a P value**=0.026.

Regression analysis of independent variables with overweight and obesity has revealed that there was a significant positive association of excessive body weight with snacks no./day (p-value=0.004, odd ratio=3.112), and fruits intake (p-value=0.014, odd ratio=2.767).

While, there was a significant negative association of student's BMI with the physical activities (p-value=0.049, odd ratio=0.566) (Table 5).

BMI[a]		B	Sig.	Exponential (B)	95% Confidence interval for exponential (B)	
					Lower bound	Upper bound
Obese	Intercept	-6.041-	0.029			
	Meal No	0.688	0.218	1.99	0.666	5.948
	Snacks No	1.135	0.004	3.112	1.432	6.761
	Dairy Product	-.561-	0.231	0.57	0.228	1.428
	Fruits	1.018	0.014	2.767	1.233	6.209
	Soft Drinks	0.765	0.052	2.15	0.992	4.657
	Hours TV	0.643	0.252	1.902	0.632	5.722
	Hours Mobile	-.238-	0.68	0.788	0.254	2.448
	Sleeping	0.109	0.841	1.116	0.383	3.251
	Watch and Eating	-.355-	0.519	0.701	0.239	2.059
	Physical activity	-.570-	0.049	0.566	0.294	1.09
	Way	0.678	0.21	1.969	0.682	5.685
	Age	-.416-	0.828	0.66	0.016	27.873
	Mother Education	0.793	0.266	2.21	0.547	8.925
	Mother Occupation	-.813-	0.234	0.444	0.116	1.69
	Father Education	0.076	0.909	1.079	0.292	3.981
	Father Occupation	0.671	0.405	1.956	0.403	9.488

Table 5. Logistic regression analysis of independent variables with the nutritional status of the students.

Discussion

This study was conducted on a sample of children who attended the public primary schools in AL-Nasiriya city and was founded that the overall prevalence of obesity and overweight was 28% (17.9% were obese and 10.1% were overweight). In comparison with the results of studies done in other cities of Iraq, the overall prevalence in the current study (28%) was higher than the results of Basrah and Kirkuk studies (24.1%), while it was lower than the results of studies done in Baghdad and Diyala (32.9% and 33.6% respectively) [9,10,20,21]. The prevalence in the current study was lower than that reported in several neighboring high income Arabic countries like Kingdom of Saudi Arabia, 45% (18.0% were overweight and 27.0% were obese), and Kuwait 37% (16.8% for obese and 20.2% for overweight) [8,22]. In the present study, the prevalence of overweight and obesity (28%) was nearly similar to that reported in Iran 29% (21.1% were overweight and 7.9% were obese) [23]. The higher prevalence of overweight and obesity in some countries in comparison to others was attributed to the differences in the lifestyles, cultural, environmental, and genetic factors.

In the current study, although the girls were more obese than boys, and the boys were more overweight than girls, these results were statistically not significant (p-value=0.269). This result was in agreement with that reported in another Iraqi study by Lafta et al. [24]. While in Togo study, overweight prevalence among girls was two times higher than in the boys [13]. Others showed that male gender was a risk factor for obesity with a higher rate of obesity and overweight than females [12,25].The present study showed that overweight and obesity had no significant association with the educational level of the parents.

This result was in agreement with that reported by Bhuiyan et al. in Bangladesh, but does not agree with the results of the Italian study and Iranian study [12,26,27]. Both studies revealed that low educational level of the parents are associated with greater risk of overweight and obesity among their children. On the other hand, in Basrah study and Nablus study, high student's BMI associated with increase in parental education [9,25]. No correlation was found in this study between student's BMI and mother's employment and father's occupation. This result is similar to the results of Nablus study in which mother’s profession was not having significant association with pupils' BMI, while others found that children of working mothers and fathers were most likely to be obese compared to those whose parents were unemployed [9,22,25]. In the current study, a highly significant association of overweight and obesity with the number of snacks consumed per day was demonstrated. This is in agreement with the results of other study done by Sun et al. in China reported that snacks are considered a major cause of overweight and obesity [28]. Increase snack consumption leading to excess energy intake and weight gain.

This study also demonstrated that increase consumption of fruits was associated with increase in the student's BMI and this correlation was statistically significant. This result is consistent with that reported by Sharma et al. [29]. Fruit contains large amounts of simple sugars (glucose, fructose, sucrose, etc.). These simple sugars, such as glucose and fructose, are thought to be the main source for generating fatty acids by hepatic de novo lipogenesis, which may increase the levels of hepatic and circulatory triglycerides, very-low- and low-density lipoproteins, thereby resulting in increases in adipose tissue and obesity [29,30]. Thus, the consumption of

certain types of fruits that are rich in simple sugars is the most likely mechanism for the association between obesity and fruit intake. On the other hand, the beneficial effects of the fruits on the health are well established and many studies showed a negative relationship between daily fruit intake and weight gain [13,31].

The present study didn't reveal a significant correlation for excess body weigh with number of meals, dairy products, soft drinks and sweet intake per day. These results disagree with those reported in other studies [25,29,32,33]. In this study, although the prevalence of overweight was higher among students watching TV less than 2 hr/day compared to those watching TV less than 2hr/day, it was statistically not significant. Also, no significant correlation was demonstrated in the current study between high BMI and playing with smart device, eating while watching TV, and sleeping time, which does not coincide with other studies in which significant association was reported. Lack of activity and sedentary behaviors are major risk factors for overweight and obesity in children [7,11,13,27].

Small sample size or cross suctional nature of this study may attribute to the lack of association in the present study. With respect to physical activity, this study was found a significant negative association between student's BMI and their activity in and outside their schools and revealed that obesity was less prevalent among physically active students compared to inactive ones. This result was in consistent with the results of a study conducted by Sulaiman et al. in Erbil and Bhuiyan et al. in Bangladesh [26,33-35]. Both studies reported that physical activity was a protective factor from excess body weight. Physical activity increases total energy expenditure, which can help them stay in energy balance and maintain a healthy body weight.

Conclusion

From this study we conclude that the prevalence of overweigh and obesity among primary school children was relatively high in Al Nasiriya city. Snacks and fruits intake were independent risk factors for high BMI. Our study also revealed that physical activity was a protective factor from excess body weight.

Recommendations

Due to the rapid increases in obesity prevalence and the serious public health consequences, we need urgent preventive interventions to reduce the health burden of the childhood obesity pandemic. The hallmark of prevention and treatment of obesity includes lifestyle modification (healthy eating habits, increased physical activity, and decrease sedentary behaviors). Parents must play their role in these interventions.

Nutrition and physical activity lessons can be introducing into the school curriculum to learn the students how can choose and maintain healthy lifestyles. Schools can provide healthy food choices and limit marketing of unhealthy foods like sugar-sweetened beverages in the cafeteria. Annual measurement of weight, height and BMI for each student in the school and inform the results to their families. This would help parents to become aware of any weight abnormality and early intervention.

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