Relationship of Eating Habits and Obesity among Children under 5 Years in Primary Health Care Centers at Hilla City, Iraq

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Abstract
Background: Nutrition during childhood is very important for development and can have long-term health effects. The COVID-19 lockdown has caused major changes to daily life, including for children. The aim of study is to determine eating habits associated with obesity in children under 5 years. Subjects and Methods: A case-control study was conducted on 100 children with obesity and 100 healthy participants in primary health care centers at Hilla city. The study used a convenience sampling technique (non-random sampling technique) to choose the children with obesity and control groups via take body anthropometry and direct interviews. The data collection continued for a period of 3 months starting on 2nd January 2022 and ending on 1st April 2022. Results: The results of this study indicate that the children who eat fruits and vegetables once a week are likely at higher risk for obesity by 2.419 times than those who eat daily fruits and vegetables. While children who eat 2-4 times per week of sweets, biscuits, and spaghetti, Junk food (Chips & Nuts) are less at risk for obesity at an odd ratio (0.314, 0.052, and 0.344) times than those who eat it daily respectively. Drinking soft drinks (Cola, Pepsi) once week children are less at risk for obesity than those who drink it daily (B=-3.250-; P. value=0.003; OR= 0.039; 95% C.I 0.005-0.325). Conclusion: The study showed that increased consumption of fruits and vegetables associated with less risk of obesity, in contrast, few consumptions of sweets and soft drinks quietly and fast food and eating before sleep, and when watching TV associated with a lower risk of obesity.
Keywords: Obesity, eating habits, Risk factors, behavior.

1. Introduction

Normal-weight obesity, defined as having a normal body mass index (BMI) but having an excessive quantity of body fat, is unhealthy for people [1]. Although recent studies have shown that normal-weight obesity is associated with nutritional or dietary inadequacies and physical performance disadvantages, its origins and the time period of its development are still unknown [2].

Currently, countries all over the globe are concentrating on promoting a balanced diet and good eating habits, which are important determinants of health and illness, including the emergence of overweight and obesity [3, 4]. The eating habits of children and adolescents are particularly significant due to the pandemic of childhood obesity [5, 6], since bad eating patterns in childhood and adolescence can endure and have a negative impact on adult health [7-9].

According to a study conducted in 124 developed and developing nations, there was an improvement in dietary quality worldwide between 1980 and 2009, with a rise in the availability of energy from fruits, vegetables, and vegetable oils, as well as a decline in the availability of energy from sugar and animal fats (1).

A rise in animal fat consumption, an increase in food availability, a decline in physical activity, and urbanization have all followed global economic expansion [10]. The acceleration of dietary transition in many developing nations has resulted in a decrease in stunting and an increase in overweight and obesity [11, 12].

2. Patients and Methods

Design of the study

A case- Control study was conducted on 100 children with obesity and 100 healthy participants

2. Setting of the Study

The study was conducted in primary health care centers at Hilla city, Babylon Governorate, which is located south of the capital, Baghdad

3. Sampling technique

Total number of health care sectors in hilla city was 2 included (first Hilla sector, second Hilla sector), 50% of health care centers had been taken from each sector, 10 health care centers were selected randomly from these sectors,primary health care centers from health care sectors collection were selected by simple random sampling. The study used convenient sampling (non- random sampling technique) to choose case and control by direct interviewer to parents of child and anthropometric measure.

4. Method of data collection

The data was collected by direct interview with the parent of child after translated questionnaire to local language (Arabic) by using close-ended questions and body anthropometry was taken to every child by

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using (a weighing scale to measure body weight and length tape measure for measuring height and Tape measure for mid-arm circumference (Shaker's tape).

5. Statistical Analysis

The data for each questionnaire was encoded and entered into an excel sheet before in being transferred to the Statistical Packages for Social Sciences (SPSS)-26 Version. Extract data in the form of statistical tables consisting of frequencies, percentages, means, standard deviations, and ranges (minimum and maximum values). Statistical significance was taken into account when the P-value was equal to or less than 0.05. Univariate and Multivariate logistic regression analysis was used to identify the risk factors associated with obesity.

3. Results

1. Socio-demographic Characteristics

The table 1 showed that the highest percentage of children with obesity in the age group 5 years 36 (36.0%). The mean age was 3.97±0.958, and the range (was 2-5). Fifty percent of children with obesity each for boy and girl. As for mother education, 55 (55.0%) of the participants with obesity were their mothers who have college/ institute certificates, and 46 (46.0%) of them were their mother's unskilled workers. Concerning father education, the results found that the highest percentage 52 (52.0%) of the participants with obesity their fathers have college/ institute certificates, and 77 (77.0%) of them were their fathers low professional. Regarding the crowding Index, the current study found that a high percentage 94 (94.0%) of the children with obesity have a less crowded (<3) level.

As for the demographic variables of the control group, table (1) shows the highest percentage of the control group in the age group 5 years 40 (40.0%). The mean age was 4.03±0.979, and the range (was 2-5). Regarding gender, it sets that a distinct boys preponderance of 68 (68.0. As for mother education, 51 (51.0%) of the healthy children were their mothers who have college/ institute certificates, and 45 (45.0%) of them were their mother's low professionals. Concerning father education, the results found that the highest percentage of 51 (51.0%) of the healthy children their fathers have college/ institute certificates, and 70 (70.0%) of them were their fathers low professional. Regarding the crowding Index, the current study found that a high percentage of 86 (86.0%) of the control group have a less crowded (<3) level.

Table (1) The distribution of socio-demographic characteristics of children with obese and control group

		Obese		Control	
		No	%	No	%
Child age (years)	2 years	8	8.0	9	9.0
	3 years	23	23.0	19	19.0
	4 years	33	33.0	32	32.0
	5 years	36	36.0	40	40.0
	Mean± SD (Range)	3.97±0.958 (2-5)		4.03±0.979 (2-5)	
Gender	Boy	50	50.0	68	68.0
	Girl	50	50.0	32	32.0
Mother education	Illiterate	5	5.0	2	2.0
	Read & write	4	4.0	4	4.0
	Primary school	9	9.0	6	6.0
	Secondary school	13	13.0	18	18.0
	College/ Institute	55	55.0	51	51.0
	Higher education	14	14.0	19	19.0
Mother occupation	High professional	41	41.0	18	18.0
	Low professional	13	13.0	45	45.0
	Unskilled workers	46	46.0	37	37.0
Father education	Illiterate	1	1.0	-	-
	Read & write	11	11.0	4	4.0
	Primary school	6	6.0	3	3.0
	Secondary school	15	15.0	17	17.0
	College/ Institute	52	52.0	51	51.0
	Higher education	15	15.0	25	25.0
Father occupation	High professional	17	17.0	30	30.0
	Low professional	77	77.0	70	70.0
	Unskilled workers	6	6.0	-	-
Crowding Index	Less crowded (<3)	94	94.0	86	86.0
	Average (3-5)	6	6.0	14	14.0
	Overcrowded (>5)	-	-	-	-

Table 2 represents the Univariate Logistic Regression analysis to identify variables dependently associated

with Obese. The results of this study indicate that there is no significant association between socio-demographic characteristics and obesity (P. value >0.05), except for gender, and the professional of the mother. The results found that girl children are likely at higher risk for obesity at 2.125 times than boys. While children whose mothers have low professionals are a likely at less risk for obesity than children who their mother have high professionals (B= -2.065-; P. value< 0.001; OR= 0.127; 95% C.I 0.055-0.291).

Table (2) Univariate Logistic Regression analysis to identify variables dependently associated with Obese

		B	P. value	OR	95% C.I. for OR	
					Lower	Upper
Age groups per years	2 years	Reference				
	3 years	0.309	0.592	1.362	0.440	4.215
	4 years	0.149	0.785	1.160	0.398	3.380
	5 years	0.012	0.982	1.013	0.353	2.903
Gender	Boy	Reference				
	Girl	0.754	0.010	2.125	1.196	3.775
Education level of mother	Illiterate	Reference				
	Read & write	-0.916-	0.403	0.400	0.047	3.424
	Primary school	-0.511-	0.605	0.600	0.086	4.167
	Secondary school	-1.242-	0.174	0.289	0.048	1.727
	College/ Institute	-0.841-	0.328	0.431	0.080	2.323
	Higher education	-1.222-	0.178	0.295	0.050	1.746
professional of the mother	High professional	Reference				
	Low professional	-2.065-	<0.001	0.127	0.055	0.291
	Unskilled workers	-0.605-	0.091	0.546	0.270	1.103
Education level of father	Illiterate	Reference				
	Read & write	-20.191-	1.000	0.000	0.000	.
	Primary school	-20.510-	1.000	0.000	0.000	.
	Secondary school	-21.328-	1.000	0.000	0.000	.
	College/ Institute	-21.184-	1.000	0.000	0.000	.
	Higher education	-21.714-	1.000	0.000	0.000	.
Professional of the father	High professional	Reference				
	Low professional	0.663	0.055	1.941	0.986	3.821
	Unskilled workers	21.771	0.999	2850837958.00	0.000	.
Crowding Index	Less crowded (<3)	Reference				
	Average (3-5)	-0.936-	0.067	0.392	0.144	1.066

2. Eating habits of children

The eating habits of children with obesity are shown in table 2. The table found that the highest percentage (41.0%, 47.0%, 510%, 56.0%, and 72.0%) of children with obesity daily consumed "fruits and vegetables", "sweets", "milk, and other dairy products", "eating during watching TV or playing with IPad", and " eating breakfast" respectively. While the highest percentage (45.0%, 67.0%, 69.0%, 41.0%, and 37.0%) of them were consumed once a week of "biscuits and spaghetti", "soft drinks (Cola, Pepsi)", "fast foods (Burger)", "Eating before sleep", and "Junk food (Chips & Nuts)" respectively.

Regarding the control group, the same table reveals that the highest percentage (68.0%, 56.0%, 39.0%, and 70.0%) of the healthy children were daily consumed "fruits and vegetables", "milk, and other dairy products", "eating during watching TV or playing with IPad", and" eating breakfast" respectively. While the highest percentage (36.0%, 62.0%, 80.0%, 76.0%, 65.0%, and 47.0%) of the healthy participants were once week consumed "sweets", "biscuits and spaghetti", "soft drinks (Cola, Pepsi)", "fast foods (Burger)", "Eating before sleep", and "Junk food (Chips and Nuts)" respectively.

Table 3 represents the Univariate Logistic Regression analysis to identify the eating habits of children associated with Obese. The results of this study indicate that the children who eat fruits and vegetables once a week are likely at higher risk for obesity by 2.419 times than those who eat daily fruits and vegetables. While children who eat 2-4 times per week of sweets, biscuits, and spaghetti, Junk food (Chips & Nuts) are less at risk for obesity at an odd ratio (0.314, 0.052, and 0.344) times than those who eat it daily respectively. Drinking soft drinks (Cola, Pepsi) once week children are less at risk for obesity than those who drink it daily (B=-3.250-; P. value=0.003; OR= 0.039; 95% C.I 0.005-0.325). The participants who eat before sleep and eat while watching TV or playing with IPad 2-4 times per week are less at risk for obesity at an odd ratio (0.226, and 0.320) times than those who daily eat before sleep and eat while watching TV or playing with IPad respectively.

Table (2) The distribution of children with obese and control group according to Eating habits of children					
		Obese		Control	
		No	%	No	%
Eating fruits & vegetables	Daily	41	41.0	68	68.0
	2-4 times/ week	35	35.0	24	24.0
	Once a week	24	24.0	8	8.0
Eating sweets	Daily	47	47.0	28	28.0
	2-4 times/ week	34	34.0	36	36.0
	Once a week	19	19.0	36	36.0
Eating biscuits and spaghetti	Daily	14	14.0	1	1.0
	2-4 times/ week	41	41.0	37	37.0
	Once a week	45	45.0	62	62.0
Drinking milk and other dairy products	Daily	51	51.0	56	56.0
	2-4 times/ week	33	33.0	28	28.0
	Once a week	16	16.0	16	16.0
Drinking soft drinks (Cola, Pepsi)	Daily	19	19.0	1	1.0
	2-4 times/ week	14	14.0	19	19.0
	Once a week	67	67.0	80	80.0
Eating fast foods (Burger)	Daily	12	12.0	-	-
	2-4 times/ week	19	19.0	24	24.0
	Once a week	69	69.0	76	76.0
Eating before sleep	Daily	39	39.0	14	14.0
	2-4 times/ week	20	20.0	21	21.0
	Once a week	41	41.0	65	65.0
Eating while watching TV or playing with IPad	Daily	56	56.0	39	39.0
	2-4 times/ week	27	27.0	24	24.0
	Once a week	17	17.0	37	37.0
Eating breakfast	Daily	72	72.0	70	70.0
	2-4 times/ week	16	16.0	17	17.0
	Once a week	12	12.0	13	13.0
Eating Junk food (Chips & Nuts)	Daily	32	32.0	14	14.0
	2-4 times/ week	31	31.0	39	39.0
	Once a week	37	37.0	47	47.0

Table (3) Univariate Logistic Regression analysis to identify Eating habits of children associated with Obese						
Univariate Logistic Regression		B	P. value	OR	95% C.I. for OR	
					Lower	Upper
Eating fruits & vegetables	Daily	Reference				
	2-4 times/ week	1.605	<0.001	4.976	2.045	12.105
	Once a week	0.883	0.008	2.419	1.265	4.624
Eating sweets	Daily	Reference				
	2-4 times/ week	-1.157-	0.002	0.314	0.152	0.650
	Once a week	-0.575-	0.089	0.563	0.290	1.091
Eating biscuits and spaghetti	Daily	Reference				
	2-4 times/ week	-2.960-	0.005	0.052	0.007	0.409
	Once a week	-2.536-	0.017	0.079	0.010	0.632
Drinking milk and other dairy products	Daily	Reference				
	2-4 times/ week	0.094	0.817	1.098	0.498	2.419
	Once a week	0.258	0.423	1.294	0.689	2.431
Drinking soft drinks (Cola, Pepsi)	Daily	Reference				
	2-4 times/ week	-3.122-	0.003	0.044	0.006	0.338
	Once a week	-3.250-	0.003	0.039	0.005	0.325
Eating fast foods (Burger)	Daily	Reference				
	2-4 times/ week	-21.300-	0.999	0.000	0.000	.
	Once a week	-21.436-	0.999	0.000	0.000	.
Eating before sleep	Daily	Reference				
	2-4 times/ week	-1.485-	<0.001	0.226	0.110	0.468
	Once a week	-1.073-	0.015	0.342	0.144	0.812
Eating while watching TV or playing with IPad	Daily	Reference				
	2-4 times/ week	-1.139-	0.002	0.320	0.158	0.648
	Once a week	-0.244-	0.485	0.783	0.395	1.554
Eating breakfast	Daily	Reference				
	2-4 times/ week	-0.108-	0.803	0.897	0.383	2.101
	Once a week	-0.089-	0.818	0.915	0.429	1.952
Eating Junk food (Chips & Nuts)	Daily	Reference				
	2-4 times/ week	-1.066-	0.006	0.344	0.161	0.738
	Once a week	-1.056-	0.008	0.348	0.159	0.763

Table 4 represents the Multivariate Logistic Regression analysis to identify the eating habits of children associated with Obese. The results of this study indicate that after adjustment using

multivariable logistic regression, eating biscuits and spaghetti, eating biscuits and spaghetti, drinking soft drinks (Cola, Pepsi), and eating before sleep, these foods have a significant association with obesity compared to the Univariate Logistic Regression analysis in the table (3).

Table (4) Multivariate Logistic Regression analysis to identify Eating habits of children associated with Obese

Multivariate Logistic Regression		B	P. value	OR	95% C.I. for OR	
					Lower	Upper
Eating fruits & vegetables	Daily	Reference				
	2-4 times/ week	0.904	0.079	2.469	0.901	6.764
	Once a week	0.493	0.233	1.637	0.728	3.680
Eating sweets	Daily	Reference				
	2-4 times/ week	-0.846-	0.092	0.429	0.161	1.147
	Once a week	-0.072-	0.865	0.930	0.404	2.143
Eating biscuits and spaghetti	Daily	Reference				
	2-4 times/ week	-3.005-	0.008	0.050	0.005	0.452
	Once a week	-2.442-	0.030	0.087	0.010	0.789
Drinking soft drinks (Cola, Pepsi)	Daily	Reference				
	2-4 times/ week	-3.189-	0.009	0.041	0.004	0.447
	Once a week	-3.636-	0.004	0.026	0.002	0.319
Eating before sleep	Daily	Reference				
	2-4 times/ week	-1.217-	0.006	0.296	0.124	0.706
	Once a week	-1.656-	0.004	0.191	0.061	0.593
Eating while watching TV or playing with IPad	Daily	Reference				
	2-4 times/ week	-0.681-	0.133	0.506	0.208	1.229
	Once a week	0.695	0.106	2.004	0.862	4.660
Eating Junk food (Chips & Nuts)	Daily	Reference				
	2-4 times/ week	-0.141-	0.774	0.868	0.331	2.276
	Once a week	-0.460-	0.376	0.631	0.228	1.749

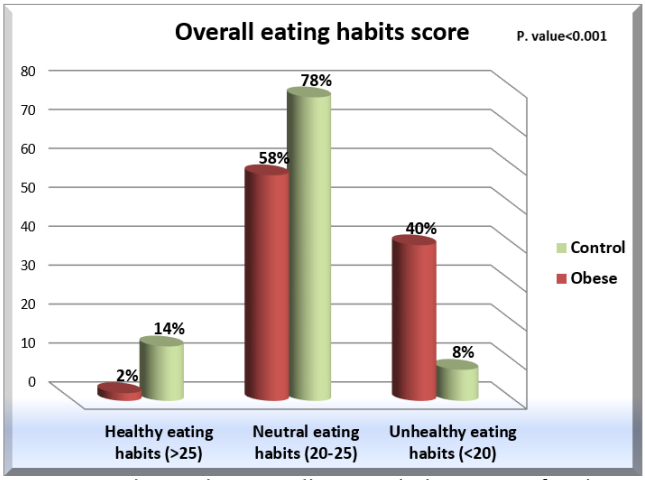

Figure (1) shows the overall eating habits score for the children with obese and control group

Figure 1 shows that the highest percentage (78.0%, and 58.0%) of the healthy and obese children have neutral eating habits respectively. While 40.0% of the children with obesity have unhealthy eating habits (a high energy) compared to the healthy children (low energy) 8.0%. There is a significant association between the children with obesity and the control group according to overall eating habits score (P. value <0.001).

4. Discussion

The results found that girls are likely at higher risk for obesity at 2.125 times than boys. This result is in agreement with the findings study done by Mahmudiono et al. [13], who reported that girls children were lower likely to be underweight and stunted than boys (OR = 0.612; 95% CI = 0.441–0.849). Also, these results agreed with the study findings conducted in Ahwaz, Iran [14] which found that the prevalence of obesity is higher in girls than in boys. in Australia the study by Sanigorski et al. [15] reported that Obesity and overweight were shown to be more common in girls than in boys (29.6 % ±1.4 % vs. 23.9 % ±1.3 %, respectively).

The results of this study indicate that the children who eat fruits and vegetables once a week are likely at higher risk for obesity by 2.419 times than those who eat daily fruits and vegetables. This result is in agreement with the study findings Mahmudiono et al. [13], which found that eating fruits are significantly reduced the risk of obesity (OR=0·4; 95% C.I 0·1- 0·9, P = 0·03). Fruit and vegetables' possible function in avoiding overweight and obesity is due to its low-calorie density, high dietary fiber content, and accompanying increased satiety impact. The physical disruption of fruit is critical for satiety [16]. Another explanation is that obesity is caused by a decrease in energy expenditure rather than a rise in energy consumption [17]

In this study, children who eat 2-4 times per week of sweets, biscuits, and spaghetti, Junk food (Chips & Nuts) are less at risk for obesity at an odd ratio (0.314, 0.052, and 0.344) times than those who eat it daily respectively. These results are consistent with [18] who revealed that fast-food consumption (OR= 1.35, 95% CI 1.29–1.41), and consuming sweets (OR =1.32, 95% CI 1.25–1.39) are more at risk for obesity. While in Bangladesh [19], which found that eating cakes and biscuits less than 3 days a week was found to be protective (AOR = 0.33, p = 0.02). In Italian, study by Di Renzo et al. [20], reported that the increased consumption of junk food is associated with

elevated BMI. A study by Scharf et al. [21], revealed that sugar-sweetened beverages with obesity risk in children. The present study shows that drinking soft drinks (Cola, Pepsi) once week children are less at risk for obesity than those who drink it daily (B=-3.250-; P. value=0.003; OR= 0.039; 95% C.I 0.005-0.325). These results agreed with the study findings conducted in Brazil [22] who found same results. Also, a study by Basu et al. [23], which found that Soft drink consumption is significantly associated with overweight, and obesity including in low- and middle-income countries. The mechanism of the effect of soft drinks on weight gain is consistent with a previous study, which stated that soft drinks increase higher intake of fructose and intake of carbohydrates. Fructose boosts thermogenesis, triglycerides, lipogenesis, and blood pressure in the short term, but has a lesser impact on leptin and insulin release than glucose. Changes in body weight, fat accumulation, and triglycerides, as well as an increase in inflammatory markers, have been seen in controlled feeding trials [24].

The participants who eat before sleep is less at risk for obesity at an odd ratio (0.226) times than those who daily eat before sleep. These results agreed with the study findings conducted in Brazil [22] who found that eating before sleep is significantly associated with obesity. A possible explanation for this result is that eating before bed may reduce a child's physical activity and thus reduce energy consumption. Finally, children may become obese as a result of these reasons.

The participants eat while watching TV or playing with IPad 2-4 times per week are less at risk for obesity at an odd ratio (0.320) times than those who daily eat while watching TV or playing with IPad respectively. These results agreed with the study findings conducted by (24), which found that eating while TVV was significantly associated with overweight/ obesity (OR = 1.28; 95% CI: 1.17, 1.39). A possible explanation for this result may be consistent with [25], who reported that Mobile Internet-connected electronic gadgets enable access to activities formerly linked with sedentary behavior. These gadgets may be used in any location because they are portable. As a result, delivering these gadgets to children in circumstances that generally encourage physical activity may result in a decrease in physical activity behavior.

Finally, the results of this study indicate that 40.0% of the children with obesity have unhealthy eating habits (a high energy) compared to the healthy children (low energy) 8.0%. There is a significant association between the children with obesity and the control group according to overall eating habits score (P. value <0.001). These results are consistent with Some studies [26, 27], which revealed that energy intake is higher in obese compared with healthy weight children.

5. Conclusions and Recommendations

The study showed that increased consumption of fruits and vegetables associated with less risk of obesity, in contrast, few consumptions of sweets and soft drinks quietly and fast food and eating before sleep, and when watching TV associated with a lower risk of obesity. Health education through seminars or electronic social media to educate parents about healthy habits and healthy food that reduce obesity towards their children.

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