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Risk Factors of Obesity among Children Under 5 Years in Hilla City

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Abstract

Childhood obesity was rarely seen. But over the past few years, more people have started to see this thing. This issue is mostly attributable to families' shifting lifestyles in the modernized Iraq, where they now have greater spending power, easier access to goods and services, and the means to live more comfortably and opulently because to advancements in technology. 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. 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 boys and girls. 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). In addition, a high percentage of obese children gain weight after covid-19. The study revealed female children, mothers with low professional, the mother that gained a high weight during pregnancy, and the heredity of obesity are significantly associated with an increased risk of obesity in children. Health care providers should highlight concerning the risks of obesity and providing prevention strategies, ensuring parental participation by setting policies, guidelines and precautionary measures which should ideally be developed.

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Keywords: Obesity; Assessment; Risk factors; Overweight; Hilla.

1. Introduction

Obese children are more likely to become obese adults and are more likely to have a number of morbid disorders, such as early menarche and thelarche in girls, advanced pubertal development in males, and negative effects on bone maturation and growth in both boys and girls. Most organs can be affected by childhood obesity, which can potentially have major effects including hypertension, dyslipidemia, insulin resistance/diabetes, hepatic steatosis, and psychological issues [1]. Worldwide, 43 million children (35 million in developing nations) are thought to be obese or overweight, and another 92 million are thought to be at danger of becoming overweight. From 4.2 percent in 1990 to 6.7 percent in 2010, obesity and overweight have grown [2]. However, it is impossible to monitor the regional level using global estimates [3]. A rise in animal fat consumption, an increase in food availability, a decline in physical activity, and urbanization have all followed global economic expansion [4]. The acceleration of dietary transition in many developing nations has resulted in a decrease in stunting and an increase in overweight and obesity [2, 3].

1.1. Aim of Study

To assess the risk factors of obesity among children under 5 years in primary health care centers at hilla city.

2. Patients and Methods

2.1. Design of the study

A case- Control study was conducted on 100 children with obesity and 100 healthy children.
The data collection continued for period 3 months starting on 2nd January 2022, ending on 1st April ,2022.

2.2. 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.

Nomenclature			
SPSS	Statistical Package for the Social Sciences	SES	Socio-Economic Status

2.3. 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.

2.4. 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 using (a weighing scale to measure body weight and length tape measure for measuring height to calculate body max index for every child, Tape measure for mid-arm circumference (Shaker's tape)).

2.5. 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 logistic regression analysis was used to identify the risk factors associated with obesity.

3. Results

3.1. 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 boys and girls. 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 children with obesity their fathers have college/ institute certificates, and 77 (77.0%) of them were their father's 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 boy's 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 father's 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 Distribution of obese child and control group according to socio-demographic variables

		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	Boys	50	50.0	68	68.0
	Girls	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 Relation between some variables and obesity

		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	Boys	Reference				
	Girls	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

3.2 Medical history of Mother

Table 3 shows that the highest percentage of 38 (38.0%) of children with obesity were whose mothers had a pre-pregnancy weight of 60-69 Kg, in contrast, 34 (34.0%) of the healthy children were whose mothers had a pre-pregnancy weight of 50-59 Kg. While the highest percentage (51.0%, and 47.0%) of the obese and healthy children were their mothers who gained weight during pregnancy by 10-14 Kg respectively. Regarding gestational diabetes, the results found that a high percentage (87.0%, and 95.0%) of the obese and healthy children were whose mothers have no gestational diabetes respectively. The highest percentage (82.0%, and 88.0%) of the healthy children were whose mothers have no pre-eclampsia toxemia respectively. Regarding taking drugs during pregnancy, the study found that mothers did not take drugs during pregnancy in the highest percentage of 63 (63.0%) of children with obesity vs. 60 (60.0%) of the healthy children. As for the family history of obesity, the highest percentage (65.0%, and 79.0) of the obese and healthy children have no family history of obesity, respectively.

Table 3 Distribution of obese child and control group according to medical history of Mother

		Obese		Control		P value
		No	%	No	%	
Pre-pregnancy weight (Kg)	<50Kg	4	4.0	8	8.0	0.168
	50---59	22	22.0	34	34.0	
	60---69	38	38.0	32	32.0	
	70---79	25	25.0	20	20.0	
	=>80Kg	11	11.0	6	6.0	
Weight gain during pregnancy (Kg)	<10Kg	31	31.0	45	45.0	0.085
	10---14	51	51.0	47	47.0	
	15---19	14	14.0	6	6.0	
	=>20Kg	4	4.0	2	2.0	
Gestational diabetes	Yes	13	13.0	5	5.0	0.048*
	No	87	87.0	95	95.0	

Pre-eclampsia toxemia	Yes	18	18.0	12	12.0	0.235
	No	82	82.0	88	88.0	
Drugs during pregnancy	Yes	37	37.0	40	40.0	0.663
	No	63	63.0	60	60.0	
Drug type	Anti-Depressant	-		4		-
	Dexon	4		2		
	Anti-allergic	10		13		
	Insulin	7		1		
	Anti-hypertensive	2		3		
	Contraceptives	2		1		
	Others	12		16		
Family history of obesity	Yes	35	35.0	21	21.0	0.027*
	No	65	65.0	79	79.0	

*Significant difference between percentages using Fishers exact test and Pearson Chi-square test (χ^2-test) at 0.05 level.

Table 4 represents the Univariate Logistic Regression analysis to identify the medical history of mothers associated with Obese. The results of this study indicate that there is no significant association between the medical history of the mother and obesity (P. value >0.05), except for weight gain during pregnancy, and family history of obesity. The results found that children whose mothers gained weight during pregnancy 15-19 Kg are likely at higher risk for obesity at 3.387 times than mothers who gained weight during less than 10 Kg. While children whose mothers have no family history of obesity are likely at less risk for obesity than children whose mothers have a family history of obesity (B= -0.706-; P. value< 0.029; OR= 0.494; 95% C.I 0.262-0.930).

Table 4 Relation between medical history of mother and obesity

		B	P. value	OR	95% C.I. for OR	
					Lower	Upper
Pre-pregnancy weight (Kg)	<50Kg	Reference				
	50---59	0.258	0.701	1.294	0.348	4.818
	60---69	0.865	0.188	2.375	0.654	8.620
	70---79	0.916	0.179	2.500	0.657	9.514
	≥80Kg	1.299	0.102	3.667	0.771	17.429
Weight gain during pregnancy (Kg)	<10Kg	Reference				
	10---14	0.454	0.141	1.575	0.860	2.885
	15---19	1.220	0.024*	3.387	1.173	9.778
	≥20Kg	1.066	0.235	2.903	0.501	16.840
Gestational diabetes	Yes	Reference				
	No	-1.043-	0.056	0.352	0.121	1.029
Pre-eclampsia toxemia	Yes	Reference				
	No	-0.476-	0.238	0.621	0.282	1.369
Drugs during pregnancy	Yes	Reference				
	No	0.127	0.663	1.135	0.642	2.007
Family history of obesity	Yes	Reference				
	No	-0.706-	0.029*	0.494	0.262	0.930

3.3. Medical history of children

Table 5 reveals that the highest percentage (84.0%, and 73.0%) of the obese and healthy children were a birth weight more or equal to 2.5 Kg which rested within average weight respectively. Mixed feeding was a distinct preponderance in the highest percentage (53.0%, and 44.0%) of the obese and healthy children respectively. While 36 (36.0%) for each of the obese and healthy children were the duration of feeding 12-17 months. Regarding complementary feeding time, the results found that the highest percentage (70.0%, and 69.0%) of the obese and healthy children have no complementary feeding time. Concerning CVD, Congenital anomalies, and hypothyroidism, the current study found that all participants (100.0%) of the obese and healthy children have no problems above. As for other problems, the results reveal that a high percentage of the obese and healthy children have no problems shown in Table 5.

Table 5 Distribution of obese child and control group according to medical history of children

		Obese		Control		P value
		No	%	No	%	
Birth weight (Kg)	LBW (<2.5Kg)	16	16.0	27	27.0	0.058
	Average BW	84	84.0	73	73.0	
Type of feeding	Breast-feeding	17	17.0	26	26.0	0.257
	Bottle-feeding	30	30.0	30	30.0	
	Mixed	53	53.0	44	44.0	
Duration of feeding (months)	<6m	11	11.0	7	7.0	0.071
	6---11	9	9.0	2	2.0	
	12---	36	36.0	36	36.0	
	18---	3	3.0	9	9.0	
	=>24m	41	41.0	46	46.0	
Complementary feeding time (months)	Yes	30	30.0	31	31.0	0.878

Sweets (Ice cream, drinks, Cola)	No	70	70.0	69	69.0	-
	Yes	2	2.0	2	2.0	
Biscuits	No	98	98.0	98	98.0	0.279
	Yes	16	16.0	22	22.0	
Serials	No	84	84.0	78	78.0	0.060
	Yes	22	22.0	12	12.0	
Milk and dairy products	No	78	78.0	88	88.0	0.094
	Yes	22	22.0	13	13.0	
Repeated chest infections	No	78	78.0	87	87.0	0.849
	Yes	17	17.0	16	16.0	
GIT problems and diarrhea	No	83	83.0	84	84.0	-
	Yes	6	6.0	6	6.0	
Recurrent UTI	No	94	94.0	94	94.0	0.149
	Yes	6	6.0	2	2.0	
Anemia	No	94	94.0	98	98.0	0.788
	Yes	7	7.0	8	8.0	
CVD	No	93	93.0	92	92.0	-
	Yes	-	-	-	-	
Congenital anomalies	No	100	100.0	100	100.0	-
	Yes	-	-	-	-	
Epilepsy	No	100	100.0	100	100	-
	Yes	3	3.0	-	-	
Asthma	No	97	97.0	100	100.0	-
	Yes	3	3.0	2	2.0	
Hypothyroidism	No	97	97.0	98	98.0	0.651
	Yes	-	-	-	-	
Drugs taken by child	No	100	100.0	100	100.0	-
	Yes	10	10.0	11	11.0	
Weight gain after COVID-19 and school banding	No	90	90.0	89	89.0	0.818
	Yes	28	28.0	16	16.0	
	No	72	72.0	84	84.0	0.041*

*Significant difference between percentages using Fishers exact test and Pearson Chi-square test (χ^2-test) at 0.05 level.

Table 6 represents the Univariate Logistic Regression analysis to identify the medical history of children associated with Obese. The results of this study indicate that there is no significant association between the medical history of the children and obesity (P. value >0.05), except for weight gain after COVID-19 and school banding. Children who do not weight gain after COVID-19 and school banding are likely at less risk for obesity than children who weight gain after COVID-19 and school banding (B= -0.714-; P. value< 0.043; OR= 0.490; 95% C.I 0.246-0.977).

Table (6) Relation between Medical history of children and obesity

		B	P. value	OR	95% C.I. for OR	
					Lower	Upper
Birth weight (Kg)	LBW (<2.5Kg)	Reference				
	Average BW	0.664	0.061	1.942	0.971	3.884
Type of feeding	Breast-feeding	Reference				
	Bottle-feeding	0.425	0.294	1.529	0.692	3.382
	Mixed	0.611	0.101	1.842	0.887	3.824
Duration of feeding (months)	<6m	Reference				
	6---11	1.052	0.252	2.864	0.473	17.351
	12---17	-0.452-	0.401	0.636	0.222	1.826
	18---23	-1.551-	0.060	0.212	0.042	1.066
	≥24m	-0.567-	0.284	0.567	0.201	1.600
Complementary feeding time (months)	Yes	Reference				
	No	0.047	0.878	1.048	0.574	1.914
Biscuits	Yes	Reference				
	No	0.393	0.281	1.481	0.725	3.024
Serials	Yes	Reference				
	No	-0.727-	0.063	0.483	0.225	1.041
Milk and dairy products	Yes	Reference				
	No	-0.635-	0.097	0.530	0.250	1.122
Repeated chest infections	Yes	Reference				
	No	-0.073-	0.849	0.930	0.441	1.963
Recurrent UTI	Yes	Reference				
	No	-1.140-	0.169	0.320	0.063	1.624
Anemia	Yes	Reference				
	No	0.144	0.788	1.155	0.402	3.316
Asthma	Yes	Reference				
	No	-0.416-	0.653	0.660	0.108	4.036

Drugs taken by child	Yes	Reference				
	No	0.106	0.818	1.112	0.450	2.750
Weight gain after COVID-19 and school banding	Yes	Reference				
	No	-0.714-	0.043*	0.490	0.246	0.977

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 [5], 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 [6] which found that the prevalence of obesity is higher in girls than in boys. in Australia the study by [7] 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). In this study, insignificant association between educational level, residence, crowding index, father occupation , and type of house and obesity status The finding is consistent with findings of past studies in Ghana [8]. Bell et al., (2018) [9], which revealed that there was no significant association between Maternal level of education and obesity.

The results found that children whose mothers gained weight during 15-19 Kg are likely at higher risk for obesity at 3.387 times than mothers who gained weight during pregnancy less than 10 Kg. These results agreed with Lu et al., (2019) [10], which reported that greater first-trimester gestational weight increase was linked to a greater risk of childhood overweight/obesity [OR: 1.40 (95% CI: 1.06, 1.86)]. Also, these results are agreed with [11], which found that children born to obese mothers were 2.58 times more likely to be obese than children born to mothers of normal body weight. While [12] reported that A higher maternal pre-pregnancy BMI and greater gestational age were linked to childhood obesity after birth. While children whose mothers have no family history of obesity are likely at less risk for obesity than children whose mothers have a family history of obesity (B= -0.706-; P. value< 0.029; OR= 0.494; 95% C.I 0.262-0.930). These results agreed with the previous study findings done by [13]. A possible explanation for this factor due to obesity may be a genetic condition that can be linked to environmental causes or genetic factors.

Although there was no relationship between the child's weight during birth and obesity, High pre-pregnancy BMI and excessive gestational weight increase are both independently related with greater birth weight [14]. Infants born with a high birth weight (>4 kg) or born large for gestational age are more likely to become obese than those born with a lower birth weight [15]. Data of this study revealed that, mixed feeding was a distinct preponderance in the highest percentage (53.0%, and 44.0%) of the obese and healthy children respectively. These results disagreed with [11], which found that the highest percentage 58.9% of the children were breastfeeding status. The results of this study indicated that there is no significant association between the medical history of the children and obesity (P. value >0.05), except for weight gain after COVID-19 and school banding. Children who do not weight gain after COVID-19 and school banding are likely at less risk for obesity than children who weight gain after COVID-19 and school banding (B= -0.714-; P. value< 0.043; OR= 0.490; 95% C.I 0.246-0.977). These results agreed with the study findings conducted by [16], reported that obesity is one of the most important risk factors for severe COVID-19 in children. Stavridou et al., (2021) [17] reported that Children, adolescents, and young adults gained weight throughout the COVID-19 era. During the current COVID-19 pandemic, changes in dietary practices, increased food consumption, and unhealthy food choices such as potatoes, pork, and sugary beverages were seen. Furthermore, because the constraints prohibited movement outside the house, physical exercise was limited, which is another risk factor for weight gain. The results of the current study are also in agreement with other studies conducted on the incidence of obesity in children during the Covid 19 epidemic [18]. May be due to children's low energy and lack of physical activity as a result of home restriction during the Covid 19 epidemic, which also makes a change in lifestyle and eating habits, and all these reasons may be attributed to the occurrence of obesity.

5. Conclusions and Recommendations

The study revealed female children, mothers with low professional, the mother that gained a high weight during pregnancy, and the heredity of obesity are significantly associated with an increased risk of obesity in children. Health care providers should highlight concerning the risks of obesity and providing prevention strategies, ensuring parental participation by setting policies, guidelines and precautionary measures which should ideally be developed.

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