Assessment of Nutritional Status and Food Behavior among Primary School Children in Erbil City

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Abstract--- Background and objective: As a result prevalence of sedentary lifestyles, changes in food behavior, and urbanization, particularly in developing countries, there has been an increase in the prevalence of childhood obesity and overweight which can cause numerous complications later in adulthood life. The present study was carried out in order to identify obesity prevalence rate and its risk factors among primary school children in Erbil, the Kurdistan Region of Iraq.

Patients and methods: The present cross-sectional descriptive study was carried out on 252 children aged 6-13 years chosen from primary schools in Erbil from 2017 to 2019. Required sociodemographic and socioeconomic data were collected using a researcher designed questionnaire through face-to-face interviews with the children's parents. The children's weight was measured using UNICEF calibrated digital scale, their height through a portable stadiometer, and body mass index based on their height and weight. The collected data were analyzed using suitable tests through Statistical Package for the Social Sciences (version 22).

Results: The female-to-male ratio was 1.15:1. Most of the students (73.4%) had been breastfed for 7 or more months. Most of them (62.3%) did not have a family history of obesity. Of them, 42.9% were found to be obese and 17.5% were overweight. Their nutritional status was found to be significantly correlated with their food habits, age, grade, maternal occupation, family history of obesity, daily pocket money, breastfeeding duration, and socioeconomic status (p<0.05). However, there was no significant association between their nutritional status and gender, parents' marital status, father occupation, and parents' educational level (p>0.05).

Conclusion: Food habits, age, grade, maternal occupation, family history of obesity, daily pocket money, breastfeeding duration, and socioeconomic status are among risk factors for childhood obesity/overweight. Therefore, children with such risk factors are recommended to be taken into special consideration in order to prevent their probable obesity/overweight early.

Keywords--- Childhood Obesity, Risk Factors, Primary School Students, Nutritional Status, Food Habit.

I. INTRODUCTION AND BACKGROUND

Research has indicated that childhood obesity and overweight is increasing all over the world [1]. According to the statistics on children aged 5-19 years published in 2016, 213 million were overweight and 124 million were obese [2]. Moreover, high-, middle-, and low-income countries have been reported to have high rates of childhood obesity and overweight [3, 4]. The prevalence rate of obesity and overweight among children aged 12-19 in Erbil,

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the Kurdistan Region of Iraq has been reported to be 9.3% and 1.6%, respectively [5]. The results of another study that was carried out on secondary school students aged 13-17 years in Slemani, the Kurdistan Region of Iraq revealed the prevalence of obesity and overweight to be respectively 11.3% and 20.6% [6]. Erbil City can be characterized by rapid changes in food behavior, technological development, urbanization, and economic growth which has been reported as the characteristics of areas with a high prevalence of childhood obesity and overweight [7-10].

Overweight and obese children are possibly to be the future overweight and obese adults who will probably develop non-communicable diseases (NCDs) such as cardiovascular diseases, diabetes, dyslipidemia, and hypertension [11-14]. Childhood obesity has also been shown to be associated with immediate adverse consequences such as educational attainment and psychological problems [2, 15, 16].

The increasing trend in the prevalence of obesity and overweight among children particularly in the Middle East has been attributed to physical inactivity, demographic and socioeconomic factors, recent changes in eating habits, and multiple pregnancies [17]. Also, intake of sweetened drinks has been reported to play a significant role in causing childhood overweight and obesity [18]. Some studies have indicated that childhood overweight or obesity is more prevalent in families with a higher level of parental education and a high income [19, 20]. Research has indicated that early diagnosis of the risk factors, which are mostly modifiable, can lead to childhood overweight and obesity [21]. Therefore, it is highly significant to identify such risk factors in different regions and different age groups. In this regard, the present study aimed to assess nutritional status and food behavior among primary school children in Erbil City, the Kurdistan region of Iraq.

II. METHODS AND MATERIALS

Study Design and Setting

The present descriptive (cross-sectional) study was conducted in order to assess nutritional status and food behavior among primary school children in Erbil City, the Kurdistan region of Iraq from October 1, 2017 to August 1, 2019.

Study Sample

The study sample was chosen by multi-stage approaches including cluster, stratified, and simple random sampling, which led to recruiting 252 primary school students from among a target population of 6614 students. For this purpose, using cluster multistage sampling, Erbil city was divided into six geographical sectors depending on Erbil Municipality, and two primary schools were selected from each sector by a randomized sampling method. Finally, stratified sampling was employed in order to select grades one to six of primary school, and a simple random sampling was used to pull near 5% from each school strata and reach a sample size of 252 students.

Data Collection

Data collection was performed by utilizing a researcher-designed questionnaire. The first section of the questionnaire was aimed at gathering data on demographic characteristics of the children (including age, gender, grade, child ranking, child's past medical history, child's BMI, and amount of pocket money) and their parents

(including marital status, employment, level of education, family history of obesity, and socioeconomic status). Its second section was related to the child's nutritional behavior, which consisted of 22 Likert scale questions with four responses and 10 multiple-choice questions. Moreover, socioeconomic status was measured through a questionnaire aimed at collecting data on parental educational level, the number of family members, crowding index, type of house, and properties. For measurement of the socio-economic status, we used questionnaire that contained information of the parents that was related to the educational level, number of family members, crowding index, type of house and properties, and the scores in this section were distributed as high (70-100), moderate (40-69), and low (10-39). The questionnaires were completed through face-to-face interviews with the children's parents at their home.

The children's weight was measured to the nearest 0.1 kilograms with a child wearing light clothes and no shoes using UNICEF calibrated digital scale (UNICEF electronic scale Seca 890). Their height was measured to the nearest centimeter with the child standing without wearing shoes using a portable stadiometer (Seca 208 body meter, secavogel and GmbH, and Co, Hamburg, Germany). Their body mass index was calculated using the following equation:

$$BMI = weight\ (kg) / [height\ (m)]^2$$

The BMI for each child was determined using an international standardized chart according to gender-specific BMI form CDC 2-20 years to get percentile of them and to categorize the BMI as follows:

Weight Status Category Percentile Range

Underweight	BMI < 5th percentile
Healthy weight	BMI for age≥5 and<85 percentile
Overweight	BMI for age≥85 and < 95th percentile
Obese	BMI ≥ 95th percentile

The validity of the questionnaire was the form was confirmed by giving it to 10 experts who had experience in the field of competence, and their views were taken into account in the final draft of the questionnaire. In order to check its reliability, a pilot study was conducted in which a random sample of 30 primary school children were selected from one of the primary schools, which revealed its reliability to be r=0.790.

Data Analysis

The collected data were analyzed through descriptive and inferential statistics using SPSS version 22. A correlation was applied in order to determine the association between the socio-demographic status of children and their nutritional status. Also, regression was conducted to find out the relationship between the nutritional status of primary school children and their food behavior.

Ethical Consideration

The ethical considerations were taken into account by obtaining approval from the College of Nursing, Hawler Medical University, the Kurdistan Region of Iraq. Moreover, approval was obtained from the Directorate of Education in Erbil. In addition, informed consent was taken from each parent.

III. RESULTS

Analyzing the sociodemographic data revealed that the students' age range was 6-13 years with 31% belonging to the age group 10-11 years, 28.2% to 6-7, 21% to 8-9, and 19.8% to 12-13. Regarding their gender, 53.6% were females and 46.4% were males. In terms of their grades, they were first to sixth grade of primary school, and the distribution of the students was almost similar in different grades. Regarding their parents' marital status, most of them (94%) lived together. The results showed that the highest level of the mothers' and fathers' education was university and higher with 17.5% and 37.7%, respectively. In terms of their occupation, most of the mothers (72.2%) were unemployed and 25.8% were governmental employees. Also, 57.5% were non-governmental employees and 36.1% were governmental employees. It was seen that 44.8% were given 750-1,250 Iraqi Dinars (ID) and 36.1% received 250-750 ID. In terms of the breastfeeding period, 37.7% were breastfed 7-12 months, 35.7% more than 1 year, and 25.4% less than 6 months. In terms of family history of obesity, it was seen that 62.3% of them had no history and 13.1% had maternal history of obesity (See Table 1).

Table 1: Socio-demographic Distribution of Primary School Children

Sociodemographic Variables	Category	Frequency (N)	Percentage (%)
Age	6-7	71	28.2
	8-9	53	21
	10-11	78	31
	12-13	50	19.8
Total		252	100
Gender	Boy	117	46.4
	Girl	135	53.6
Total		252	100
Grade	First-class	45	17.9
	Second class	31	12.3
	Third class	38	15.1
	Fourth class	52	20.6
	Fifth class	45	17.9
	Sixth class	41	16.3
Total		252	100
Parents' Marital status	Live together	237	94
	Mother died	1	0.4
	Father died	13	5.2
	Father married more than one	1	0.4
Total		252	100
Mother educational level	Illiterate	4	1.6
	Read and write	17	6.7
	Primary school graduate	61	24.2
	Intermediate school graduate	57	22.6
	Secondary school graduate	19	7.5
	Institute	50	19.8
	University or higher education	44	17.5
Total		252	100
Father educational level	Illiterate	1	0.4
	Read and write	3	1.2
	Primary school graduate	31	12.3
	Intermediate school graduate	36	14.3
	Secondary school graduate	56	22.2

	Institute	30	11.9
	University or higher education	95	37.7
Total		252	100
Mother Occupation	Governmental Employee	65	25.8
	Non-Governmental Employee	4	1.6
	Not Employee	182	72.2
	Dead	1	0.4
Total		252	100
Father Occupation	Governmental Employee	91	36.1
	Non-Governmental Employee	145	57.5
	Dead	13	5.2
	Retired	3	1.2
Total		252	100
Pocket money per day	250-<750 ID	91	36.1
	750-<1250ID	113	44.8
	≥1250 ID	48	19
Total		252	100
Breastfeeding History	≤6 Months	64	25.4
	7-12 Months	95	37.7
	More than 1 year	90	35.7
	None	3	1.2
Total		252	100
Family History of Obesity	Nobody	157	62.3
	Father	13	5.2
	Mother	33	13.1
	Brother	17	6.7
	Sister	15	6
	Father+ Brother/ Sister	6	2.4
	Mother + Brother/ Sister	11	4.4
Total		252	100

The socioeconomic data indicated that 45.2% had a moderate socioeconomic level, 36.9% had a high socioeconomic level, and 17.9% had a low socioeconomic level (See Table 2).

Table 2: Students' Socioeconomic Status

Socioeconomic level	Frequency (N)	Percentage (%)
Low	45	17.9
Moderate	114	45.2
high	93	36.9
Total	252	100

In terms of the students' nutritional status, 42.9% of them were obese, 25.4% had a healthy weight, 17.5% were overweight, and 14.3% were underweight (See table 3).

Table 3 Students' Nutritional Status

Students' nutritional status	Frequency (N)	Percentage (%)
Underweight	36	14.3
Healthy Weight	64	25.4
Overweight	44	17.5
Obese	108	42.9
Total	252	100%

The results also showed that most of the students (79%) had somewhat healthy food behavior, 19% had inconsistent food behavior, and 2% had constant healthy food behavior (See Table 4).

Table 4: Student's Food Behavior

Food Behaviors	Frequency (N)	Percentage (%)
Inconstant food behavior	48	19
Somewhat healthy food behavior	199	79
Constant healthy food behavior	5	2
Total	252	100%

According to the results of the present study, there was a significant relationship between the students' food behavior and their nutritional status (p=0.002) (See Table 5).

Table 5: Relationship between the Nutritional Status and Food Behavior of the Primary School Children

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
Students' Food Behavior	0.509	162	0.194	3.132	0.002

The results also illustrated that there were significant associations between the students' nutritional status and their age, grade, mother occupation, family history, daily pocket money, breastfeeding duration, and socioeconomic status. However, no significant associations were found between the students' nutritional status and their gender, the parents' marital status, father occupation, father educational level, and mother educational level (See Table 6).

Table 6: Association between Nutritional Status and Sociodemographic Characteristics of the Selected Primary School Children

	Category	Child age	Gender	Grade	Marital status of parents	Father occupation	Mother occupation	Father educational level	Mother educational level	Family History (Obesity)	Daily pocket money	Breastfeeding duration	Socioeconomic status
The students' nutritional status	Pearson Correlation	0.168**	-0.086	0.161*	0.023	0.017	-0.139*	0.002	0.120	-0.128*	0.449**	-0.273**	0.271**
	Sig.(2-tailed)	0.007	0.175	0.010	0.712	0.788	0.027	0.973	0.057	0.043	0.000	0.000	0.000
	Total	252	252	252	252	252	252	252	252	252	252	252	252

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

IV. DISCUSSION

The present study was an investigation into the prevalence of and the factors affecting childhood obesity in primary schools located in Erbil, the Kurdistan region of Iraq. The study was carried out on children aged 6 to 13 years. Some other studies have also focused on this age range, among them are the ones conducted by Karki et al. (2019) in Nepal, Bac et al. (2012) in Cracow, Poland, and Zahner et l. (2006) in Switzerland [22-24]. A total of 252 primary school students were studied, of whom 135 (53.6%) were females and 117 (46.4%) were males. Different studies have reported different male-to-female ratios. For example, in the study conducted by Karki et al (2019), 55% of the children were males and 45% were females [22], while 47.5% of the children in Adebimpe's study were males, and 52.5% were females [25]. Similar to this study, the study conducted by Shabu and Al-Tawil consisted of more girls than boys with respectively 53.4% and 46.6% [5].

The results revealed that most of the families had a moderate or high economic level with 45.2% and 36.9% of the families, respectively. This finding is similar to another study carried out in Slemani, another big city in the Kurdistan Region of Iraq, by Qadir et al (2014) who indicated that most of the families had a moderate or high economic level respectively with 63.7% and 33.5% [6]. However, the results of the present study are in agreement with those of the study conducted in Erbil by Shabu and Al-Tawil (2012) who showed that most families had a moderate or high economic level respectively with 51% and 23% [5].

The results of the present study indicated that 42.9% of the children were obese, 17.%% were overweight, 25.4% had a healthy weight, and 14.3% were underweight. Unlike the present study, Qadir et al. (2014) reported remarkably lower prevalence rate for obesity at 11.3%, but a higher rate for overweight at 20.6%. They also reported a remarkably higher prevalence rate of normal health at 65.8% [6]. In their study carried out in Erbil by Shabu and Al-Tawil (2012) reported quite lower rates of obesity, overweight, and normal weight prevalence at respectively 1.6%, 9.3%, 89% [5]. Comparing the results of these three studies carried out in the Kurdistan Region reveals an increasing trend in prevalence of obesity, which can be contributed to changes in food behavior, technological development, urbanization, and economic growth which has been reported in the Kurdistan Region of Iraq over the last few years [26, 27]. Research has also indicated an increase in prevalence of sedentary activities such as sitting and watching TV, and playing video games among children, which can play a great role in elevated prevalence of obesity and overweight among this age group, such that prevalence of sedentary activities has been reported to increase 42% in Egypt and 22.4% in Jordan from 2003 to 2007 [28].

The results of the study showed that most of the students (79%) had somewhat healthy food behavior and 19% had inconsistent food behavior. It was also seen that there was a significant relationship between students' nutritional status and food behavior (p=0.002). This finding is in good agreement with the results of the study carried out in Duhok, the Kurdistan Region of Iraq by Abdullah et al. (2017) who observed that 71.3% of the students had somewhat healthy food behavior. They also concluded a significant relationship between the students' nutritional status and their food behavior at a p-value of 0.001 [29].

A significant relationship was also seen between the primary students' age and their nutritional behavior (p=0.007). Similar findings were reported in a study carried out in Isfahan, Iran by Shahsanai et al. (2018) indicated a significant relationship at p-value<0.001 between nutritional status and age in the primary students [30]. The relationship between nutritional status and the primary students' grades was also found to be significant (0.010). This finding can be justified through the previous finding (i.e. the significant relationship between the students' nutritional status and their age). These findings are also in agreement with the study conducted by Hassan et al. (2016) who reported age as a significant factor in obesity/overweight status of primary students [31].

The results also indicated that there was a significant negative relationship between the students' nutritional status and their mother's occupation (p-value=0.027). This finding is similar to the one reported by Hassan et al. (2016) [31]. It was also concluded that a family history of obesity has a significant negative relationship with the primary students' nutritional status (p-value<0.05). This finding is supported by the study conducted by Reuter et al. (2018) [32]. It was also seen that pocket money had a significant effect on the students' nutritional status (p-

value=0.000). This finding is in line with the one reported by Taha and Marawan (2015) [33]. In addition, breastfeeding duration was found to have a significant negative relationship with nutritional status of the students (p-value=0.000). This finding is in line with the one reported by Siqueira et al. (2007) who reported that children who have never been breastfed are two-fold more likely to develop childhood obesity or overweight [34]. This finding is also supported by other studies [35-37]. Socioeconomic status was also found to be significantly correlated with the primary students' nutritional status (p-value=0.000). This finding is supported by previously conducted studies [38, 39].

However, the results of the present study revealed no significant relationship between the primary students' nutritional status and their gender, parents' marital status, father occupation, or parents' educational level (p-value>0.05). These findings are in good agreement with the results of the previously conducted studies [40-42].

V. CONCLUSION

Obesity and overweight have an increasing trend among primary school students. Food behavior has a significant effect on nutritional status. Moreover, nutritional status of primary students can be significantly affected by their age, grade, maternal occupation. family history of obesity, daily pocket money, breastfeeding duration, and socioeconomic status. These risk factors should be used to diagnose children prone to childhood obesity/overweight and provide them with early treatment.

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