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Original Article

Prevalence and Associated Risk Factors of Childhood Obesity and Overweight in Erbil City, Kurdistan, Iraq: A Household Survey

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Abstract: The prevalence of overweight and obesity has increased dramatically during the last three decades. It is estimated that 170 million youngsters (under the age of 18) worldwide are overweight. Obesity is commonly regarded as one of the most significant public health problems of the early 21st century due to its rapid rise and severe public health consequences. According to previous research, the prevalence rate of obesity and overweight increased in Erbil. This study aims to determine the prevalence of childhood overweight and obesity rates in Erbil. This study was a household survey based on a cross-sectional study that was conducted, and a multi-stage sampling strategy was used to choose the study sample. A questionnaire was conducted to collect the data, SPSS was used for analyzing the data, and Chi-square (X^2), was used to identify any kind of association between different variables in the study, whereas the p-value was considered (0.05). Regarding ethical approval, the study was conducted under the guidelines of the ethical approval research committee in the College of Medicine. In this research, the prevalence rate of obesity and overweight was 30.4%, 7.7% of them were obese, and 22.7% were overweight. The obesity rates between males and females were not different. Lifestyle and habit had an impact on increasing weight gain, though the number of meals, outside eating, fast foods, and snacks between meals were statistically not significant. However, eating without hunger was significant the p-value was (0.008). On the other hand, the children's habit of using electronic devices, smartphones, and other devices was significant, either using their mobile phone or their parent's phone. In conclusion, in Erbil city, the prevalence rate of obesity and overweight was dramatically increased, as well as the lifestyle factor that contributed to the development of these conditions, especially among those children exposed to multi-screen devices. According to these results, families have to improve their lifestyles and decrease the use of electrical devices by children.

1. Introduction

Internationally, the incidence of childhood obesity has increased in the past few decades. According to the estimations of the International Association for the Study of Obesity (IASO) and the International Obesity Task Force (IOTF), approximately 200 million children are classified as either overweight or obese [1]. The lack of standardized anthropometric measuring techniques, varied sample designs,

response proportions, and age ranges hinder the ability to make accurate comparisons across nations. The number is 3. Furthermore, there has been a significant discrepancy in prevalence estimates of overweight (OW) and obesity in children because of the utilization of diverse criteria for their definition [2]. Obesity is a disorder characterized by the excessive accumulation of body fat to the point that adverse health effects are possible. Obesity in children is a serious medical issue and it is determined by a body mass index (BMI) that is significantly higher than the average for a person's height and age. It is a major problem for public health in the 21st century [3].

Weight gain is a disorder characterized by the accumulation of extra fat mass, which has numerous negative impacts on health, mainly cardiovascular diseases (CVDs), which shortens life expectancy and/or exacerbates health problems [4]. The majority of academics agree that high-calorie consumption and lifestyle factors are the primary contributors to obesity and overweight [5]. The prevalence of overweight and obesity among youngsters is continuing to rise, and the proportion of children and adolescents between the ages of 5 and 19 who are either overweight or obese increased globally [6].

The high incidence of overweight and obesity has severe effects on health. Increased body mass index (BMI) is a key risk factor for cardiovascular disease, type 2 diabetes, and numerous cancers (such as colorectal cancer, kidney cancer, and esophageal cancer) [7]. These diseases, which are sometimes referred to as non-communicable diseases (NCDs), not only result in early mortality but also in long-term morbidity [8]. In addition, overweight and obesity in children are associated with substantial decreases in quality of life [9], and an increased risk of taunting, bullying, and social isolation [10].

Obesity is regarded as one of the major public health issues at the beginning of the twenty-first century due to the rapid increase in obesity prevalence and its severe public health effects [11]. A considerable number of the world's population, especially those living in cities, are overweight, and this is a concern in both low and middle-income nations, The incidence of childhood obesity has been documented in both rich and poor countries; however, the prevalence of childhood obesity in low-income countries is increasing at a faster rate [12].

In addition, the genetic susceptibility to being overweight contributes to less than 5% of the total, and it is typically necessary for it to be linked with environmental and behavioral factors to affect and increase weight gain. Although there are several causes of childhood obesity, one of them is genetic and taking certain medications [13]. Additional possible reasons include the timing of meals, the structure of meals, the fact that families who dine together tend to consume more healthful foods, eating out, and watching television while eating are all factors that are connected with high-fat consumption [14]. In the last three decades, increased fast food intake has been associated with obesity in many families, particularly those with both parents working outside the home, whose children prefer this meal because it is convenient and inexpensive [15].

The purpose of this household study was to determine the prevalence rate of obesity and overweight among children in Erbil City.

2. Materials and Methods

The household survey is conducted using a cross-sectional research design. Added a component for analyzing data. In 2022, the survey was undertaken in Erbil City north of Iraq and the capital of the Kurdistan regional government. The total sample of the study was 1200 children.

The study includes children aged between 5-18 years. Multiple variables, including age, gender, weight, height, and BMI, were considered. The estimated population was taken by the director of statistics in Erbil; the population number was 353,032 the sample size was conducted by the Epi-info application. The sample size was 1200 for both males and females. The allowable margin of error was 2.5%, and the design influence was 2. Therefore, the anticipated number of sample size was 1179 children. A confidence level of 95% was used. Several factors contributed to raising the sample size, which led to a total of 1200 children being surveyed Erbil City was divided into six municipalities in each municipality 200 samples were collected randomly by multi-stage cluster, and systematic random sampling was used, and later on, the participant was selected by Systematic Random Sampling. The first house was chosen randomly in each district, then after the first house was chosen the 5th from the first

selection but if parents refused to participate in the study and refused to give information and participate with the child, the research team visited the next house.

The permission for collecting the data was given by the director of security in Erbil. The study work was approved by the ethical committee at the College of Medicine at Hawler Medical University and the registered number is (7-3-2022).

2.1. Study tools

The weight balance was used for weight and the meter for height, hip, and waist circumference, The height of the participants was assessed using a portable stadiometer (Model 214 Road Rod, Seca Corp, Hanover, MD, USA) with measurements rounded to the closest 0.1 centimeter (cm), excluding the use of shoes. Weight was measured using previously calibrated electronic scales (electronic digital weighing scale Medel Cristal, ref: 92081, Italy) to the closest 0.1 kg, and the questionnaire was designed for the lifestyle of children and the demographic characteristics of children.

2.2. Data collection

This study's survey included a variety of questions designed to evaluate the socio-demographic status of the study population. The pilot

study was done for 50 children to develop the implications of the study and the improvement of a questionnaire. The research team was trained before the data collection and the questionnaire was filled out directly by the research team by direct interview with children can answer the questions however, some questions some questions requested that parents give information about the lifestyle of their children, especially if the child could not provide information or answer the questions.

The team visited the house directly after official permission from the security directorate and explained the aim and significance of the study, if parents refused to participate in the study and refused to give information and participate with the child, the research team visited the next house. The data collection started in March and ended June in 2022, the household sample included children aged 5 to old and the setting of the research was Erbil City. In addition to taking anthropometric measurements such as weight, height, waist circumstances (WC), and hip circumference (HC), the questionnaires were filled out indirectly for accurate purposes. The data was entered the Microsoft Excel 2016 and exported and analyzed by IBM SPSS Statistics 25. Chi-square (X2) and person correlation were used in the investigation to find any associations between the various variables. All p-values presented in this research have been adjusted to a significant level of (0.05). To assess the questionnaire's reliability, a survey was administered to a sample of 50 individuals residing in an area of Erbil City. The questionnaire's internal consistency was evaluated using Cronbach's alpha. The internal consistency of the data was assessed in this study using Cronbach's alpha in IBM SPSS Statistics version 25. The questions were categorized based on their similarities or common characteristics.

The demographic questions were included in the analysis. The results of Cronbach's coefficient alpha (a) indicated that the scale's reliability was excellent. The contents and validity of the questionnaire were developed and submitted to a council of experts. The experts were assigned the responsibility of evaluating the questionnaire's clarity, relevance, and suitability for accomplishing the objectives of the current study. They suggested implementing slight modifications.

The child's socioeconomic status was assessed based on the parent's level of education, family size, housing type (e.g., owned or rented), number of rooms, and ownership of a car. An exceptional scoring system, referred to as the "Thirty-two score," was devised for this study. This technique has considered all the previously stated socio-economic aspects. According to this system, each parent's level of education and occupation were assigned a score of five. The crowding index was assigned a score of three, which was the calculated number of family members. The resulting index was divided into three groups: less than ≤ 3, between 4 and 7, and ≥ 8. The possession of a car was assessed using a two-point scale. The kind of home, whether it was owned by the family, partly owned, or rented, was evaluated using a four-point scale. Ultimately, the socioeconomic level of the households of the children was

categorized into three distinct groups: low status (≤ twelve scores), medium status (thirteen-to-sixteen scores), and high status (seventeen and more scores).

3. Results

3.1. Sample socio-demographic information

The study population was divided into male and female, 632(52.7%) of them were male, and 568 (47.3%) were female, children from 5 years to 18 years were included and divided into three age groups. the age from 5-9 years was (46.1%), 10-14years (43.4%), and 15-18years (10.5%) for both males and females. It was discovered that (83.2%) attended school, while (16.8%) did not attend. It is evident that illiterate mothers have the highest (33.64%) versus (18.5%) of fathers less illiterate rate, and approximately (15.9%) of fathers hold diplomas or bachelor's degrees, versus (14%) of mothers. In addition, the fathers holding advanced degrees were (2.8%) vs (1.7%) of mothers.

Regarding the father's occupation around (15.9%) had a high rank employment, however only around (9.5%) of mothers had a high rank employed. On the other hand, (2.2%) of the fathers were unemployed but the unemployment rate among the mothers was around (88.5%).

The birth order for the child around (28.1%) was the first while (47.3%) had a second to third birth order. Concerning, for crowding index the majority of children live in families between five to eight members (76.3%). The majority of children (71.8%) reside in their residences, and the majority of families (65%) have one to two rooms excluding the kitchen and living room. While for family income (83.5% of the families have enough for daily needs, 15% do not have enough for daily needs, and 1.5% exceed daily needs).

Table 1: Describe distributions of the study population by the socio-demographic criteria.

Socio-demographic criteria		Frequency	Percentage (%)
Sex	Male	632	52.7
	Female	568	47.3
Age groups	5-9	553	46.1
	10-14	521	43.4
	15-18	128	10.5
Attend to school	Yes	999	83.2
	No	201	16.8
Father Education	Illiterate	222	18.5
	Read & write	146	12.2
	Primary	352	29.3
	Intermediate/Secondary	235	19.6
	Institution/College	191	15.9
	Higher Education	34	2.8
	Not alive	20	1.7
Mother Education	Illiterate	401	33.4
	Read & write	104	8.7
	Primary	322	26.8
	Intermediate/Secondary	184	15.3
	Institution/College	168	14
	Higher Education	20	1.7
	Not alive	1	0.1
Father Occupation	High rank/Employed	191	15.9
	Skilled manual worker	73	6.1
	Unskilled manual worker	890	74.2
	Unemployed	26	2.2
	Not alive	20	1.7
Mother Occupation	High rank/Employed	114	9.5
	Skilled manual worker	21	1.8
	Unskilled manual worker	2	0.2
	Unemployed/Housewife	1062	88.5
	Not alive	1	0.1

No. of family members	2-4	207	17.3
	5-8	915	76.3
	9-12	73	6.1
	>12	5	0.4
Birth Order	1st	337	28.1
	2nd-3rd	568	47.3
	4-6th	253	21.1
	7-9th	35	2.9
	≥10th	7	0.6
Type of Housing	Owner	862	71.8
	Partially owned	119	9.9
	Rented	218	18.2
	Government-owned/Help	1	0.1
No. of Rooms	1-2	780	65
	3-4	380	31.7
	>4	40	3.3
Possession of Car	Yes	960	80
	No	240	20
Family Income	Not enough for daily needs	180	15
	Enough for daily needs	1002	83.5
	Exceeds needs	18	1.5

3.2. The Status of Children's Weight

According to the 2007 World Health Organization standard calculated both genders' BMI-for-age for 5-19 years (z-scores). The majority of study populations were normal weight (63.8%). It was found that 22.7% of the children were overweight, whereas, 7.7% were obese, then 5.9% were underweight. The research population's weight distribution is shown in Figure 1.

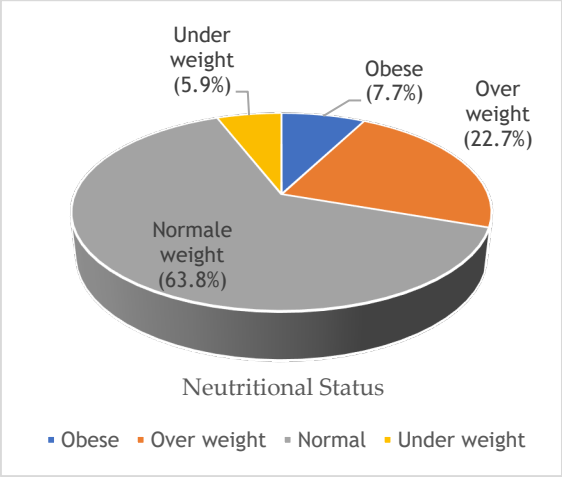

Figure 1: Illustrate the situation of children's weight.

3.3. Overweight and Obesity

These two weight status categories (overweight and obese) were merged under the name "Overweight" to be compared with the "Normal Weight" category, which represents the normal BMI of the remaining children in the study population. The underweight children were disregarded and categorized as "Normal Weight." Figure 2 shows that overweight and obese were 30.4% while normal and underweight were 69.6%.BMI Correlation with Waist Circumference: As demonstrated in Figure 3, Pearson Association (r) was equivalent to 0.730 (P0.01) indicating a substantial positive correlation between BMI and waist circumference among the subjects of the study.

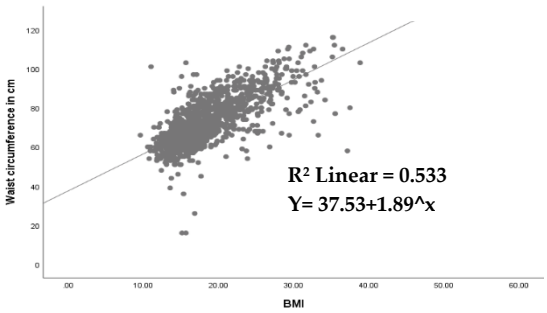

Figure 2: BMI correlation with Waist circumference.

Figure 3 displays a Pearson Correlation (r) of (0.001) the (p-value 0.269), which indicates not a statistically significant but uncertain relationship between body mass index and waist-to-hip ratio.

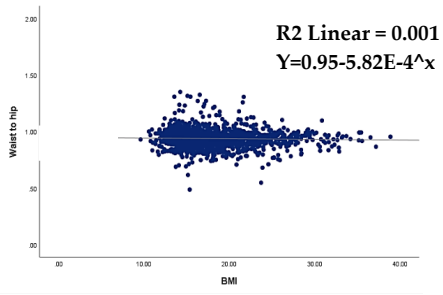

Figure 3: The correlation between BMI and Waist-to-Hip Ratio.

3.4. The sex and weight status

The nutritional status insignificant differences by gender, as the p-value for males and females, was 0.865. Though, however, it seems that the Overweight (overweight and obese) with normal weight category males had a slightly higher rate than females (32.4%, 28%), besides underweight males slightly less than females (5.5%, 6.3%) consequently.

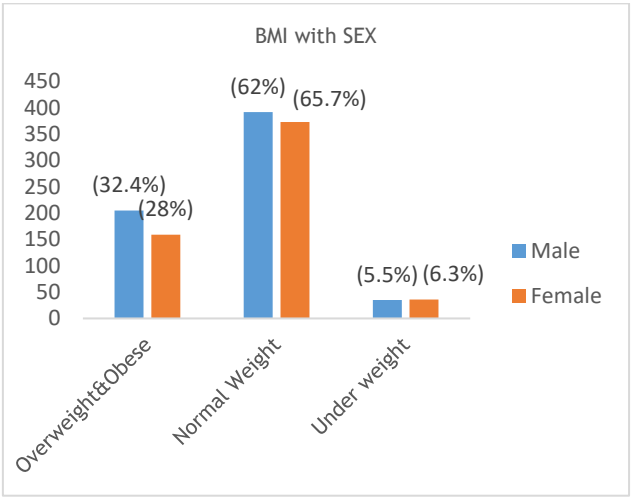

Figure 4: Illustrate the BMI with sex.

3.5. The number of main meals consumed daily

Children who consume more than three meals a day are more likely to be overweight or obese and the prevalence rate was 35.2% and overweight rates who had eaten three meals per day were 31.5% while for children who eat one time a day was 9.5%. (P<0.067).

Table 2: shows the correlation between daily meal intake and nutritional status.

Eating meals per day	Normal & Underweight	Obese & Overweight	Chi-Square (df)*	P-Value
One	19 (90.5%)	2 (9.5%)	7.147 (3)	0.067
Two	172 (73.5%)	62 (26.5%)		
Three	610 (68.5%)	281 (31.5%)		
More than three	35 (64.8%)	19 (35.2%)		

*** degree of freedom**

3.6. The source of food intake and soft/sweetened drinks

The correlation between the diversity of food, fruits, and vegetable consumption, as well as drinking soft or sweetened drinks with weight status is shown in Table 3. Address that only eating without being hungry was significant.

Table 3: shows the correlation between weight status and food/soft drink intakes.

Food and drink intakes	Normal & Underweight	Obese & Overweight	Chi-Square (df)	P-Value
Eat snacks between meals				
No	84 (68.9%)	38 (31.1%)	0.043 (1)	0.836
Yes	752 (69.8%)	326 (30.2%)		
Eat between supper and bedtime				
No	322 (70.9%)	132 (29.1%)	0.547 (1)	0.459
Yes	514 (68.9%)	232 (31.1%)		
Eating without hungry				
No	599 (72%)	233 (28%)	6.961 (1)	0.008
Yes	237 (64.4%)	131 (35.6%)		
Eating fast food				
No	84 (66.7%)	42 (33.3%)	0.600 (1)	0.439
Yes	752 (70%)	322 (30%)		
Eating outside				
No	516 (71.6%)	205 (28.4%)	3.088 (1)	0.079
Yes	320 (66.8%)	159 (33.2%)		
Eat cake, ice cream, etc..				
No	33 (76.7%)	10 (23.3%)	1.06 (1)	0.304
Yes	803 (69.4%)	354 (30.6%)		
Does the child eat fruits and vegetables?				
No	81 (63.3%)	47 (36.7%)	2.765 (1)	0.096
Yes	755 (70.4%)	317 (29.6%)		
Does the child drink soft\sweetened drinks?				
No	93 (72.7%)	35 (27.3%)	0.606 (1)	0.436
Yes	743 (69.3%)	329 0.7%)		

3.7. Habit and lifestyle

This examines a relationship between a child's weight status and their behavior, such as exercising, watching television (TV), playing video games, and using smart devices. It was discovered that a child's overweight is related to exercising (29.9%), watching TV and playing computer games (30.9%), using their mobile or other devices (32.7%), and using their parents' smartphone (51.9%). Only practicing exercise is insignificant in association with weight status, though the other three factors are statistically significant.

Table 4: Displays the habits and lifestyles of children in connection to their BMI**.**

Habit and lifestyle	Normal weight	Obese & Overweight	Chi-Square (df)	P-Value
Does the child practice exercise				
No	157 (67.7%)	75 (32.3%)	0.541 (1)	0.462
Yes	679 (70.1%)	289 (29.9%)		
Does the child watch TV, play video\computer games				
No	29 (90.6%)	3 (9.4%)	6.834 (1)	0.009
Yes	807 (69.1%)	361 (30.9%)		
The child Has their mobile or other devices				
No	340 (73.4%)	123 (26.6%)	5.063 (1)	0.024
Yes	496 (67.3%)	241 (32.7%)		
Use his\her parent's mobile or other devices				
No	799 (71.1%)	324 (28.9%)	18.19 (1)	0.001
Yes	37 (48.1%)	40 (51.9%)		

There is a relationship between children's weight and how often they consume high-calorie sweetened cakes, fast food, fruits and vegetables, and beverages, how much they exercise, how much they sleep, how much they spend watching TV, and using smart devices, and what their parents' weight status is. Depending on the outcomes only weight status for parents is significant, 66.1% rate one of the parents for overweight children were obese, 28.6% were both of them and 22.1% none of them were obese.

Table 5: Presents the recurrent eating, soft drinking, exercise, amount of sleep, spending time with electronic devices, and parents' weight status.

Frequent eating, drinking, and exercise	Normal weight	Obese and Overweight	Chi-Square (df)	P-Value
Frequent eaten Fast food				
Daily	57 (38.70%)	26 (31.30%)	1.783(1)	0.619
2-4 times a week	523 (66.10%)	268 (33.90%)		
weekly	46 (71.90%)	18 (28.10%)		
less frequent	85 (63%)	50 (37%)		
Frequently eaten outside				
Daily	13 (52%)	12 (48%)	6.670(3)	0.083
2-4 times a week	96 (69.1%)	43 (30.9%)		
weekly	63 (67.7%)	30 (32.3%)		
less frequent	148 (66.4%)	75 (33.6%)		
Frequently eaten cake, ice cream, and chocolates				
Daily	269 (69.9%)	116 (31.1%)	6.094 (4)	0.192
2-4 times a week	476 (70.2%)	202 (29.8%)		
weekly	16 (61.5%)	10 (38.5%)		
less frequent	40 (59.7%)	27 (40.3%)		
Frequently eating fruits and vegetables				
Daily	207(69%)	93 (31%)	1.933(3)	0.586

2-4 times a week	398 (65.2%)	212 (34.8%)		
weekly	19 (61.3%)	12 (38.7%)		
less frequent	90 (68.7%)	41 (31.3%)		
Frequent drink soft/sweetened drinks				
Daily	190 (63.5%)	109 (36.5%)	2.118(3)	0.548
2-4 times a week	398 (67.6%)	191 (32.4%)		
weekly	27 (61.4%)	17 (38.6%)		
less frequent	90 (63.8%)	51 (36.2)		
Frequent consume rice and potatoes				
Daily	307 (69.8%)	133 (30.2%)	6.670(3)	0.083
2-4 times a week	474 (70.7%)	196 (29%)		
weekly	33 (55%)	27 (45%)		
less frequent	22 (73.3%)	8 (26.7%)		
Frequent consume bread				
Daily	102 (60.7%)	66 (39.3%)	3.596(3)	0.308
2-4 times a week	526 (66.3%)	267 (33.7%)		
weekly	6 (54.5%)	5 (45.5%)		
less frequent	157 (68.9%)	71 (31.1%)		
Frequent practicing exercise				
Daily	204 (73.1%)	75 (26.9%)	1.903(3)	0.593
2-4 times a week	393 (70.9%)	161 (29.1%)		
weekly	42 (67.7%)	20 (32.3%)		
less frequent	48 (65.8%)	25 (34.2%)		
Spending hours watching TV and other electronic devices				
0-2	329 (70.9%)	135 (29.1%)	3.27 (2)	0.195
5-Mar	451 (68.8%)	205 (31.3%)		
>6	30 (58.8%)	21 (41.2%)		
Amount of sleeping within 24 hrs.				
<5 hr.	3 (75%)	1 (25%)	0.102 (2)	0.95
2-9 hr.	483 (69.9%)	208 (30.1%)		
>10 hr.	350 (69.3%)	155 (30.1%)		
Weight status for parents				
None of them	366 (77.9%	104 (22.1%)	30.32 (2)	0.0001
Both of them	59 (43.8%)	49 (28.6%)		
One of them	411 (66.1%)	211 (66.1%)		
Socio-economic status				
Low income	226 (73.9%)	80 (26.1%)	4.67 (2)	0.097
Middle-class income	395 (69.5%)	173 (30.5%)		
Upper-middle-class	215 (66%)	111 4%)		

4. Discussion

This study conducted a household survey to indicate the prevalence of childhood obesity in Erbil City. In addition, identifying potential risk factors in children aged from 5 to 18 years. This study incorporated BMI, which has been extensively utilized as a measure of overweight and obesity. According to the results, it was discovered that 30.4% of Participants were weight gain, 22.7% of them were overweight and 7.7% were obese. Some cross-sectional research had been done either in primary or

secondary schools in Iraq, and the Kurdistan Regional Government (KRG) confirmed that the prevalence rate of overweight and obesity had risen.

In a study that was done in Erbil, among children in primary school, the prevalence rate was 26% [16]. However, two cross-sectional studies conducted among children of primary school age and high school discovered that the prevalence rate of overweight was 30% between high school in Erbil and another study conducted in 2009 in school age found that the prevalence was 10.9% [16][17].These different findings may be attributable to the distinct periods in which the studies were performed or to the fact that may have dropped out or never enrolled in school. In European countries, obesity and overweight rates have also increased. It has been reported that the prevalence of overweight is higher in the US than in other developing nations [18].By contrast, socioeconomic status (SES) has been linked to childhood obesity, it has been suggested that in developed nations a low socioeconomic status is associated with a higher prevalence of obesity, whereas in developing nations it is contrariwise. In the Kurdistan Region of Iraq, childhood obesity has become a serious public health problem due to the increase in sedentary lifestyles and the preference for more comfortable living [19]. The majority of the parents of the study population were illiterate or unemployed, and fewer of them held higher qualifications and high-ranking occupations.

This study demonstrated that the level of education is not related to the rising percentage of childhood obesity; however, a study that was conducted in Turkey found a correlation between obese children and mother's educational level and occupational status because mothers more interacted with children, while the occupational status for mothers found no correlation with obesity. On the other hand, the father’s occupation demonstrated a relationship between their jobs and obesity [20].

The prevalence rate differences between boys and girls for childhood obesity were marginally distinct, 32.4% and 28% respectively. This minor difference may be attributable to the selection of the study population, as 52.7% of the study participants were male and 47.3% were female, and a similar finding in the US showed that there were no gender differences in weight status among children [21]. According to the other systematic review study, there were no appreciable differences in overweight between boys and girls; however, similar findings indicated that there were slight differences between males and females [22]. Our finding does not coincide with a cross-sectional study conducted among 5–17year-old school children although the prevalence of overweight was higher in girls than in boys (58% vs. 46%), respectively [23]. The justification for our result is that in our society, there were no highly significant lifestyle differences between males and females. However, a study conducted on Mexican children showed that both sexes were at risk for overweight and obesity and did not show significant differences [24].

The majority of children consumed three main meals daily because of traditional habits in the country, which demonstrated for this reason that the prevalence of overweight was higher among those who ate three times a day than one or two main meals consumption and revealed that there was no significant outcome between daily meal intake and weight gain. Conversely, another study that was carried out in Erbil showed that there was a relationship between several meal intakes and weight gain [16]. Our findings contradicted the findings of the previous study, which found that consuming between meals was substantially associated with a high BMI and represented that a low frequency of consumption was associated with a low BMI level, and by contrast, more frequent eating was associated with a high BMI [25].

Another finding was that there was not a significant relationship between snacks and eating between supper and bedtime and weight gain. 30.2% of overweight children eat snacks, while 30.1% do not. On the other hand, 31.1% had to eat between supper and bedtime, and 29.1% had not eaten. The previous study in the same area also revealed a non-significant relationship between eating snacks between meals and consumption between dinner and bedtime on the one hand and overweight status on the other. It reveals that 15.3% of children who don't eat between meals and 13.5% of those who don't eat between supper and midnight are overweight, compared to 10.6% and 10.5% of those who do eat between meals and supper, respectively [19]. The fact that snacking between meals is associated with

lower overall food intake than when parents focus only on the child's three main meals may help to clarify our judgments.

The outcome of the study found that there was no significant association between a variety of food consumption and overweight status, although one interesting finding is only eating without hunger due to a significant association between overweight children who had eaten and not eaten when not hungry (35.6% and 28%), respectively. While several studies have shown that there are relations between weight status and the variety of food and drink consumption, these tendencies have been linked to numerous alterations in the social, economic, and physical environment and dietary habits [25]. The nutrition transition is typically characterized by an increase in the consumption of energy-dense foods that are low in fiber, sugar, and sweetened beverages, a decline in physical activity, and a shift towards a more sedentary lifestyle [16].Conversely, another study found that physical inactivity did not have a significant relationship with overweight children [26].This study determined the frequency of carbohydrate consumption due to the increased prevalence of obesity and overweight, but the findings were not statistically significant, as shown by the outcomes for children who consume fast food. 30% were obese, while 33.3% were not consumed. Then other studies included in the systematic review discovered the relationship between carbohydrates and obesity and presented carbohydrate's impact on body weight[18]. On the other hand, consumption of cake, ice cream, chocolates, and sweetened drinks overweight children consumed 30.6% conversely, 23.3% were not consumed. However, another cross-sectional study declared that there was a relationship between high consumption of carbohydrates and energy drinks with overweight [26].

The study conducted in the UK specified a positive relationship between fast-food intake and weight gain and explained that fast-food consumption has risen dramatically in the last two decades[20]. Despite this, the results of this study were not statistically significant, which may be due to cultural differences and the fact that Iraqis consume less fast food than Europeans. According to the findings of this particular piece of research, there is a considerable correlation between children's exposure to screens, whether via their smartphones or those of their parents, as well as any other electronic devices, and the overall increase in the amount of time spent playing video games and watching television. The prevalence rate of overweight children who were watching TV and playing video games was 30.9% and 9.4% of them were not sitting in front of a screen for a long time, furthermore, 32.7% of them had their mobile or other electronic devices while 26.6% of them had not to own smart screen devices, overweight children who use parent’s phone or other devices was 51.9% and 28.9% was not used. According to the findings, children exposed to multi-screen and smart devices were significantly associated with being overweight.

A household survey done for American families demonstrated that early exposure to the screen at a younger age has become a potentially addictive behavior and discovered that around 50 percent of American children had their smartphone, That cross-sectional study illustrated several implications of child growth, on the other hand, found that the addition of multiscreen exposure leads to elevation of prevalence rate of obesity, in addition, verified that children exposed to multiscreen in the age group of the study either have their own devices or used their parent's devices has a significant relation with weight gain.[21]. Increased levels of early screen exposure have been associated with decreased mental abilities, decreased growth, addictive behavior, poor school performance, poor sleep patterns, and increased levels of obesity. As technology continues to interactions the current culture of early screen exposure [21]. Furthermore number of studies reported that there are relationship between timing exposure to screen activities, television watching, food intake motivation, and snacking demeanor among children [22].

Another important finding was that any parents who were overweight had a relationship with their children's weight status and found that one or both parents being overweight affected the children's weight status. This result may be influenced by genetic factors and the same result was found in a study that was done in Iran showing that there was a relationship between parent's obesity and children's weight gain [23]. Several researchers have shown the relationship between sleep quality and

weight gain and mentioned that poor sleep quality leads to obesity and overweight [24]. However, this particular research did not show a significant association between the amount of sleep and weight gain.

The current study found that the affiliation between weight gain and socioeconomic class was insignificant, a possible explanation for this might be that this study was a household survey and most families included in this study were nearly at the same economic level, despite the prevalence rate among overweight children increasing with cooperative quality of life, overweight children among families of low income 26.1%, middle class30.5%, and upper-income class 34%. The same results were reported by the prevalence rate increased in high socioeconomic even though the association was considered significant [17]. In addition, an earlier study in Saudi Arabia reported that 87% of middle-class children were either overweight or obese. In contrast, a study, which was conducted among primary school children in Erbil suggested that the prevalence rate of overweight children among low-income families was the highest [16]. Another study showed a lower BMI was connected with reporting a higher number of children identified as being from poor socioeconomic level households and children from more affluent backgrounds showed no correlation between BMI and socioeconomic status [26].

5. Conclusion

The results show that the prevalence of overweight and obesity among this target age 5-18 years should be considered for both genders, after analyzing the multifactorial causes it was discovered that those children's exposure to multi-electronic devices has a significant relationship with weight gain.

This is a household survey in the city of Erbil, and the sample was more representative of the community than previous studies that were not conducted in households. However, Erbil's newer cities and villages were excluded from the study because the security of these special districts did not allow our team to access the cities for enrolling the children. On the other hand, children younger than 5 years are excluded, as further research might be addressed for children less than 5 years and will determine which risk factors contribute to overweight children younger than 5 years.

The limitations of the study were excluding all children under five years old, and the oldest of 19 years were excluded correspondingly, and the data was collected only inside Erbil City. New villages and upscale areas inside Erbil City were excluded from the sample selection because the team could not access these areas to collect data, and most of the families that live in these areas have upper-class incomes.

The education directors in Erbil are informed concerning the prevalence rate of weight gain among children and recommend having a program with parents to decrease the prevalence rate to drop obesity and overweight in children. Suggested to health authorities in Erbil to improve the health program to decline the influence of multielectron devices among children and motivate children and parents to improve lifestyle.

Data availability: Data will be made available on request.

Conflicts of interest: The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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