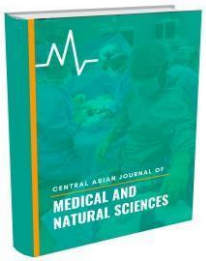

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Article

Eating Habits and Obesity in Baghdad Middle School Students

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Abstract: Obesity is a significant global public health issue with extensive health consequences, including being a major risk factor for insulin resistance, atherosclerosis, dyslipidaemia, and obstructive sleep apnoea. This study aims to determine the proportion of overweight and obesity among middle school students in Baghdad City and to examine the relationship between BMI, meal patterns, eating habits, and daily activity. Conducted from September 2023 to March 2024, this descriptive correlational study involved 360 students aged 12–15 years, selected using a convenience sampling technique. Measurements included BMI, weight, and height. Findings indicated that 26.6% of students were obese or overweight. Significant correlations were found between obesity and the consumption of sweets, soft drinks, and fast food, while eating fruits and participating in sports were inversely correlated with obesity. The study highlights the high rates of adolescent obesity in Baghdad City and underscores the need for public education through media and health facilities to address this growing concern. Further research should explore targeted interventions to mitigate obesity among adolescents.

Keywords: Overweight and Obesity, Body Mass Index, Middle School Students, Eating Habits, Baghdad City

1. Introduction

Obesity is one of the biggest problems with public health [1], and its occurrence during the past 30 years has nearly increased[2]. It was often believed that children from low-income families and those who lived in urban poverty were the primary victims of childhood obesity. However, as childhood obesity rates rise in affluent neighbourhoods and higher-income households, it now has some impact on all socioeconomic categories[3]. Obesity is a medical disorder marked by an excess of body fat that can be averse to one's health[4]. Body mass index (BMI), which is calculated as body weight divided by height, was determined by clinical observations[5]. Clearly, obesity increases the chance of death with weight, and it is thought to be the second most common preventable cause of death after tobacco. Obesity has significant negative health effects[6]. Obesity has a direct impact on health, resulting in the deaths of at least 3.8 million people annually[7]. In the United States, the average annual number of deaths linked to obesity was estimated to be 300,000[8], and in the European Union, obesity was responsible for 1 million deaths (7.7%) every year[9,10].

Obesity, high blood pressure, heart disease, and diabetes are consequences of overeating that occur over time[11]. Childhood obesity has a long-term impact on an individual's health, increasing the likelihood of developing adult-onset conditions such as insulin resistance, atherosclerosis, dyslipidaemia, and obstructive sleep apnoea[12]. The

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causes of obesity are numerous. They consist of heredity, environment, exercise, food, and psychological aspects[13].

Less than 1% of kids and teens between the ages of 5 and 19 were obese in 1975; by 2016, that number had risen to almost 340 million[14]. Approximately 25% of school-age children in England are overweight or obese. At eleven years old, this increases to about one-third[15]. It is common for schoolchildren in the Arabian Gulf States to have high rates of overweight and obesity. Studies show that the prevalence of obesity is 14.6% in Kuwait, 21% and 35% in Bahrain, 28.6% among boys and 18.6% among girls in Qatar, and 43.6% and 34.8% in males and females in Saudi Arabia[16]. In an Iranian study that sought to identify the different factors influencing juvenile obesity and overweight, it was discovered that 9.7% of children were overweight and 11.9% were obese[17]. Furthermore, as per the Turkish Statistical Institute's Turkish Health Survey, the percentage of obese individuals aged 15 years and older was 19.6% in 2016 and 21.1% in 2019[18]. According to a 2015 survey, 31.8 percent of Iraqis were overweight, 33.9 percent were obese, and 65.7% were both overweight and obese[19]. The prevalence of obesity was found to be 17.26% among the 1,350 teenagers in the study, which was carried out in Al-Najaf Al-Ashraf City to evaluate the self-esteem of fat adolescents[20]. Additionally, at intermediate schools in Basrah City, the prevalence of overweight and obesity among teenagers aged 13 to 15 was 20.6% and 22.6%, respectively. Furthermore, 22.3% of teenagers in secondary schools in Kirkuk City reported being obese. Males made up 55.8% of the obese teenagers, 42.5 percent of them were 13 years old, and 79.2% of them had a socioeconomic status score in the middle[21]. Eating habits are the regular choices that people, either alone or in groups, make about the foods they eat. Making the right dietary decisions involves using proteins, fats, carbs, minerals, and vitamins[22]. To improve the general health of the population, health care providers and health systems can implement interventions to either prevent or treat childhood obesity. The United States Preventive Services Task Force (USPSTF) advises children and adolescents over the age of six to get an obesity screening[23].

2. Materials and Methods

- **Study Design:** This descriptive correlational study was conducted from September 4th, 2023, to March 10th, 2024.
- **Study Setting:** The sample used in this research was middle school students at their schools from different places in Baghdad City at the Al-Russafa Third Education Directorate.
- **Study Population and Sampling Technique:** The population of the study is middle school students. The study was conducted in ten middle schools in Baghdad City. Five were boys, and the other five were girls affiliated with the Al-Rusafa Third Education Directorate. The total population is 5753 students. The study involves 360 randomly selected middle school students (12–15 years old) from Al-Rusafa Third Education Directorate using the convenience random sampling technique.
- **The sample exclusion criteria:**

a. Chronically ill students: those with growth hormone deficiencies, hypothyroidism, asthma, diabetes, etc.

b. Congenital anomalies, which include scoliosis, lordosis, kyphosis, dwarfism, and gigantism, are difficult to quantify and have an impact on body mass index values.

Sampling Size: We calculated the sample size using this equation formula conducted by Steven K. Thompson [24].

$$n = \frac{N \times P \times (1-P)}{\left[N-1 \times \left(\frac{d^2}{z^2}\right)\right] + [P \times (1-P)]}$$

Where:

n = Desired sample size, N = Total population (students) = 5753

d = 0.05 (margin of error), Z = 1.96 for a 95% confidence interval

P = 0.50 (Probability value)

- **Measurements:**

A questionnaire which was designed by the Centres for Disease Control and Prevention (CDC) was modified and used to gather data. The questionnaire had four parts including demographic information, meal pattern, eating habits, and daily activity and exercise. For better understanding; the questionnaire was introduced to the students in Arabic language. Body weight was measured using an electronic Seca digital scale (Model 890). The participant's weight was measured to the nearest 0.1 kg on a digital scale with bare feet and a light garment. The following methods were used to measure body height to the closest relative 0.5 centimetres after a stadiometer Seca (Model 217) was used to measure height. BMI was calculated by taking the square of the weight in kilogrammes and the height in metres, using the following formulas: heels together, barefoot, head touching the ruler, The 95th and 85th to less than 95th percentiles were used to define obesity and overweight, respectively. The BMI range of 5th to 85th percentiles was regarded as normal. Conversely, a person is classified as underweight if their BMI is below the fifth percentile.

- **Disclaimer:** The BMI calculation generated by the BMI percentile calculator that was approved by CDC(25).

- **Source:** Based on charts created by the National Centre for Chronic Disease Prevention and Health Promotion and the National Health Centre for Statistics (2000).

- **Statistical Analysis of Data:**

The statistical package for social sciences (SPSS V. 26) was utilised for data entry and analysis. The Centres for Disease Control and Prevention (CDC, 2000) standard for calculating BMI for age was followed for measuring BMI for age and sex. For a significant statistical association between meal pattern and eating habits with weight status, the spearman's rho test was performed, while point biserial correlation was used to detect the association between BMI and daily activity and exercise and T-test to investigated the difference significant in exercise with Sex.

- **Ethical consideration:**

Ethical clearance and approval to conduct the study were obtained from the College of Nursing, University of Baghdad, and Al-Rusafa Third Education Directorate. We wrote that in the structured questionnaire, "Everything in this paper will remain confidential. Thus, you do not have to write your name".

3. Results

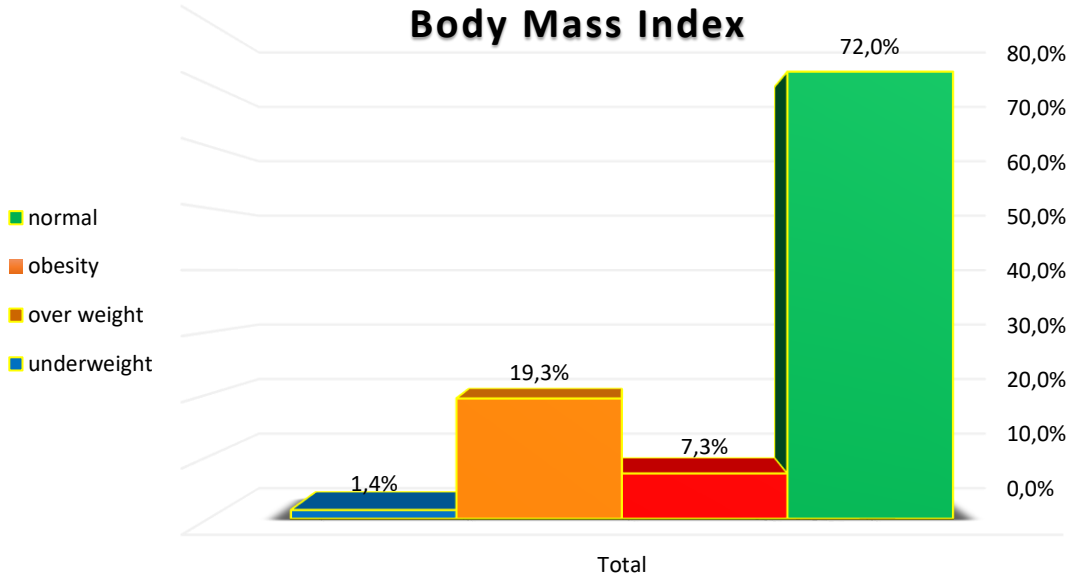

Figure 1. Distribution of Middle School Students According to Body Mass Index

Figure (1) revealed that 72% of middle school students had a normal weight, 19.3% were overweight, 7.3% were obese, and 1.4% were underweight.

Table 1. Distribution of Middle School Students According to BMI And Meal Pattern in Study Sample

Variables	Categories	BMI				Total	*P- value
		Underweight	Normal	Overweight	Obesity		
Main meal\ day	One	0	9	4	0	13	0.306
	Two	4	70	31	9	114	
	Three	1	146	16	3	166	
	More than three	0	32	18	14	64	
	Total	***5***	***257***	***69***	***26***	***357***	
Snack meal\ day	Nothing	3	70	10	1	84	0.000**
	One	1	118	24	7	150	
	Two	1	63	30	9	103	
	Three times and more	0	6	5	9	20	
	Total	***5***	***257***	***69***	***26***	***357***	

*Spearman's rho correlation coefficient, **Correlation is significant at the 0.01 level

Table (1) discovered that a child's BMI and their snack meal had a high, substantial correlation, but not with their main meal.

Table 2. Distribution of Middle School Students According to BMI and Eating Habits in Study Sample

Variables	Categories	BMI				Total	*P- value
		Underweight	Normal	Overweight	Obesity		
Vegetables	Rare	0	0	1	0	1	0.269
	Once daily	4	143	31	8	186	
	2-4 per day	0	51	13	8	72	
	1-2 per week	1	63	24	10	98	
	Total	***5***	***257***	***69***	***26***	***357***	
Fruits	Rare	0	0	0	1	1	0.000**
	Once daily	2	147	34	12	195	
	2-4 per day	0	89	9	1	99	
	1-2 per week	3	21	26	12	62	
	Total	***5***	***257***	***69***	***26***	***357***	
Dairy	Rare	0	3	1	0	4	0.064
	Once daily	2	151	42	22	217	
	2-4 per day	0	3	1	0	4	
	1-2 per week	3	100	25	4	132	
	Total	***5***	***257***	***69***	***26***	***357***	
Fish	rare	4	90	28	11	133	0.594
	once daily	0	1	0	0	1	
	1-2 per week	1	166	41	15	223	
	Total	***5***	***257***	***69***	***26***	***357***	
Chicken	Rare	2	8	3	1	14	0.834
	Once daily	2	163	44	17	226	
	2-4 per day	0	3	0	0	3	
	1-2 per week	1	83	22	8	114	
	Total	***5***	***257***	***69***	***26***	***357***	
Meat	Rare	2	42	8	0	52	0.000**
	Once daily	1	91	34	20	146	
	2-4 per day	0	0	1	0	1	
	1-2 per week	2	124	26	6	158	
	Total	***5***	***257***	***69***	***26***	***357***	
Sweet	Rare	1	3	0	0	4	0.000**
	Once daily	3	146	44	8	201	
	2-4 per day	0	31	24	18	73	
	1-2 per week	1	77	1	0	79	
	Total	***5***	***257***	***69***	***26***	***357***	
Bread	Once daily	1	64	1	0	66	0.000**
	2-4 per day	2	193	68	26	289	
	1-2 per week	2	0	0	0	2	
	Total	***5***	***257***	***69***	***26***	***357***	
Soft drink	Rare	3	97	12	2	114	0.000**

	Once daily	0	55	28	15	98	
	2-4 per day	0	0	0	2	2	
	1-2 per week	2	105	29	7	143	
	Total	***5***	***257***	***69***	***26***	***357***	
Tea	Rarely	0	53	12	2	67	0.384
	Once daily	3	114	24	9	150	
	1-2 per week	2	90	33	15	140	
	Total	***5***	***257***	***69***	***26***	***357***	
Quick meal	Rare	3	54	6	0	63	0.000**
	Once daily	1	83	36	11	131	
	2-4 per day	0	7	4	14	25	
	1-2 per week	1	113	23	1	138	
	Total	***5***	***257***	***69***	***26***	***357***	
Chips	Rare	3	49	6	0	58	0.003**
	Once daily	2	83	24	13	122	
	2-4 per day	0	1	3	0	4	
	1-2 per week	0	124	36	13	173	
	Total	***5***	***257***	***69***	***26***	***357***	

*Spearman's rho correlation coefficient, **Correlation is significant at the 0.01 level

The findings of Table (2) demonstrated the child's BMI did not significantly correlate with dairy, chicken, fish, or tea, but it did significantly correlate with vegetables, fruits, meat, sweets, bread, soft drinks, quick meals, and chips.

Table 3. Distribution of Middle School Students According BMI and Daily Activity and Exercise in Study Sample

Variables	**Categories**	**BMI**				**Total**	***P- value**
		Underweight	**Normal**	**Overweight**	**Obesity**		
Practice of Sports	Yes	4	117	14	o	135	0.000**
	No	1	140	55	26	222	
	Total	***5***	***257***	***69***	***26***	***357***	
Sleep Regularity	Yes	5	191	38	7	241	0.000**
	No	0	66	31	19	116	
	Total	***5***	***257***	***69***	***26***	***357***	
Video Games	Yes	2	95	32	10	139	0.404
	No	3	162	37	16	218	
	Total	***5***	***257***	***69***	***26***	***357***	
Internet and Social Networking Sites	Yes	4	182	53	20	259	0.361
	No	1	75	16	6	98	
	Total	***5***	***257***	***69***	***26***	***357***	

*Biserial correlation coefficient, **Correlation is significant at the 0.01 level

The findings in Table (3) indicated sleep, exercise, and a child's BMI were extremely statistically connected, but not with games or the internet.

4. Discussion

In the sample population between the ages of 12 and 15, the current study (Figure 1) displayed the percentage of children who were underweight (1.4%), healthy weight (72%), overweight (19.3%), and obese (7.3%). These findings matched with those of Talat and Shahat [26], who discovered that 69.3% of study participants between the ages of 12 and 15 were underweight and normal, 20% were overweight, and 10.7% were obese. The rate of overweight and obesity in our study is almost identical to that reported by Al Shehri et al. [27], who reported that among school-age children in Saudi Arabia, the rates of overweight and obesity have reached 23% and 9.3%, respectively. The present study (Table 2) indicated that less than 50% of children consume three meals a day, but this does not indicate that they are getting the recommended amounts of nutrients from their diet. Interestingly, in the Iraqi context, three meals a day are typically consumed: breakfast, lunch, and dinner. Lunch is regarded the primary meal, and is shared at home by family members. The main meal's association with BMI was found to be non-significant.

The outcomes are in agreement with Al-Ani et al. [28], who stated that eating a daily meal count was not associated with an increased risk of becoming overweight or obese. Conversely, a different German study including 4370 kids found an inverse relationship between the frequency of meals and the incidence of juvenile obesity and overweight, suggesting that eating frequently may be protective[29]. This study found a strong correlation between snacking and obesity. This aligns with a number of studies that discovered a strong correlation between snacking and BMI[30,31]. Furthermore, the study's findings were validated by Saleh and Maʾala [32], who noted a significant relationship ($p=0.038$) was found between the students' BMI and snack meals.

Data analysis on how eating habits and BMI are related (Table 3). A healthy diet is indicated by the amount of fruit and vegetables consumed each day, and it has been shown that a lower BMI has positive effects. Contrary to expectations, the results of this investigation show a substantial negative correlation between fruit consumption and childhood obesity. Additionally, in our study, obese children ate more fast food and chips more frequently than normal-weight children, but they ate fewer fruits and vegetables overall. Consume more fruits, vegetables, nuts, and high-fibre foods. These are the primary protective factors against childhood and teenage obesity and overweight[33]. According to this study, bread was the most popular source of carbohydrates (81%), consumed by participants 2-4 times daily. These outcomes are in line with Ahmed et al. [34]. The BMI was unexpected for the other animal food products, with the exception of meat consumption. However, there was no significant correlation between the use of dairy products. Although there was a significant association between meat intake and normal and overweight children, these outcomes Corresponding with Aeberli et al. [35]. Since fish was eaten so little, there was no meaningful correlation.

A Harvard University study claims that obesity is a result of potato chips. They observed that kids who had potato chips need a lot more calories than kids who had a mixed snack to be satisfied. This indicates that potato chips are the main food offender[36]. According to the study's findings, the majority of students (82.4%) consume fast food, with 36.7% consuming it only once a day. These foods have significantly less fibre and more fat than is advised. According to studies, eating foods high in saturated fat causes weight gain more than eating foods high in unsaturated fatty acids[37,38]. It is advised that children and teenagers eat foods high in calcium in order to achieve their maximum potential bone mass[39]. It is also concerning since a lot of people drink heavily sweetened black tea, especially girls who have increased iron needs because of menstruation. In Iraq, sweetened black tea is typically taken right after breakfast. Thus, among people with marginal iron status, high tea consumption may raise the risk of iron depletion[40].

Even now, the primary goal of middle school education is to prevent underweight students; neither overweight prevention nor ensuring that kids engage in a healthy balance of physical activity are addressed. However, our research revealed a substantial negative

connection (p=0.000) between exercise and body mass index (BMI). These findings were consistent with the Iranian studies. The study found a substantial correlation between school-age children's activities in Zahedan, Iran, and their BMI[41]. Furthermore, Doss's study found a strong correlation (p=0.001) between a student's BMI and participation in athletics[42].

According to our research, obesity and overweight have a strong correlation with regular sleep (p=0.000). Our findings are in line with those of Nabi and Mostefa [43], who found a significant correlation between students' BMI and sleep (p=0.0115). Nevertheless, it is unclear how a lack of sleep contributes to obesity[44]. According to Liu et al. [45] getting too little sleep might raise ghrelin and lower leptin levels, which increases appetite and leads to consuming more calories from unhealthy foods.

Playing video games for extended periods of time increases a child's risk of being overweight or obese[46]. This outcome opposed the current study's findings, which showed a non-significant association (p=0.404) between video games and BMI. However, these results are in agreement with Hussein [47], who reported non-significant association was between Student's BMI and duration of video games at (p=0.514). The fast progress in technology has led to children spending much more time than in the past utilising electronic devices[48]. However, our study's findings showed there was no significant correlation (p=0.361) between the Body Mass Index (BMI) and internet and social networking site use. The findings are consistent with Melchior et al. 's [49], who reported a non-significant correlation between students' internet use and BMI.

5. Conclusion

Adolescent obesity is a significant public health concern in Baghdad City. According to our research, 26.6% of the sample had a prevalence rate of overweight or obesity. On the other hand, the study examined the relationships between obesity and eating habits; it discovered a significant association between snack meal and BMI (p=0.000). Another relationship was found to exist between sleep regularity and BMI (p=0.000). The seriousness of the obesity issue is confirmed by all these results.

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