

Prevalence, determinants and knowledge toward overweight and obesity among grade 7-12 students in Duhok city

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Cite this paper as: Kherailah Kh. Bebo, Hoger A. Sadeeq, Musaab S. Abduljabar, Assist prof. Dr Saad, Y. Saeed, (20xx) Prevalence, determinants and knowledge toward overweight and obesity among grade 7-12 students in Duhok city. *Journal of Neonatal Surgery*, xx (xx), 282-289.

Received: 03/01/2025

Accepted: 07/02/2025

Published: 21/02/2025

ABSTRACT

Background: Overweight and obesity are common illnesses that impact around one billion individuals worldwide, with a higher prevalence among women than males. The study's objectives were to determine the prevalence and determinants of overweight and obesity among students and their knowledge on the subject.

Methods: A cross-sectional study was performed on 500 intermediate and high school students (250 boys and 250 girls) in classes 7-12 in Duhok city, between November 12, 2023, and December 6, 2023. Anthropometric measures were taken, and a systematic questionnaire was used to study the risk factors of overweight and obesity, and the related eating habits, attitude, and knowledge.

Results: Out of the 500 students, 48% had normal BMI. whereas 15.6% were obese and up to 23% were overweight. Seventy-six percent of students usually eat breakfast, 55.6% eat fast food twice a week, 38.6% use energy drinks, and 66.8% drink fizzy drinks 3-4 times a week. A significant statistical association was observed between students' understanding and their BMI, as well family history of obesity. The BMI of the students is associated with their educational level, but not with that of their parents.

Conclusions: About one half of the students have abnormal BMI, and 38.6% were either overweight or obese. They have a variety of bad eating habits that contribute to the high prevalence of overweight and obesity, such eating fast food, snacks, and fizzy beverages.

1. INTRODUCTION

The period of life between childhood and adulthood, known as adolescence, lasts from the ages of 10 to 19 (Nikhurpa et al, 2021). Adolescence marks the shift from dependent childhood to independent adulthood, according to the World Health Organization (Hadush et al, 2021). BMI, and waist circumference, which calculates an individual's body fat around the midsection, can both be used as diagnostic tools to determine an individual's nutritional health (Kadhom et al, 2022). An elevated body mass index (BMI) significantly increases the risk of developing non-communicable diseases like diabetes, musculoskeletal disorders (particularly osteoarthritis), endometrial, breast, ovarian, prostate, liver, colon, and kidney cancers, and other cardiovascular diseases (WHO, 2020). The global prevalence of overweight and obesity is above 1 billion, comprising 650 million adults, 340 million adolescents, and 39 million children. This figure continues to rise (WHO, 2022). The frequency of overweight and obesity in children and young adults is rising everywhere in the world, even in low- and middle-income nations (Nurwanti et al, 2019). There aren't any particular signs and symptoms connected to obesity. A waist circumference of more than 40 inches for men and 35 inches for women are two criteria that one may use to diagnose obesity: abdominal fat that is bigger than body fat in other places of the body (Health line, 2021). Overweight and obesity are primarily caused by an energy imbalance between calories spent and calories ingested (WHO, 2020). Excess weight gain can be caused by a variety of variables, such as sleep habits, physical activity level, and eating habits. Genetics, social factors of health, and using specific medications all have an impact (Hales et al, 2022). Obesity and overweight are mostly preventable; as are the non-communicable diseases they are associated with. People's choices are greatly influenced by

supportive environments and communities, because they make choosing healthier foods and regular physical activity the easiest (i.e., the most accessible, available, and affordable option). Individuals can also reduce the amount of energy they consume from total fats and sugars, increase their intake of vegetables, legumes, whole grains, and nuts, and participate in regular physical activity (WHO, 2021).

2. MATERIALS AND METHODS

Study design and setting

The study was carried out in the Duhok city, Kurdistan Region of Iraq, from 10th October 2023 to 10th January 2024. A cross-sectional study was conducted using a pre-tested questionnaire and interview. The questionnaire was made of two parts: the first requesting socio-demographic and habit features. This part included 49 questions, grouped in five sections: (a) demographic characteristics, (b) life style behaviours, here possible answers were the number of meals per day, “Yes or No” and mixture answers, (c) emotional status, possible answers were “Yes or No”, (d) socioeconomic status, here the questions were about the number of people living at home, bedrooms in the house or apartment, own home or not, and number of cars the family owns, (e) student’s knowledge about overweight and obesity, possible answers were agreement, disagreement and neutral. The last part was the measurement of students “height and weight to calculate their BMI. An electronic scale (Uniscale- Secca 874) was used in this study for measuring weight, tape measure for waist circumference, and adult height measuring device (Microtoise) for height measurement. It consisted of 11 items (questions), for each item, there were three options. In Duhok District, intermediate and high schools (grades seven through twelve) participated in the survey. The General Directorate of Education in Duhok Province (GDED) oversees both the Directorate of Education in the East of the Duhok (DEED) and the Directorate of Education in the West of the Duhok (DWED). All intermediate and high school students in 36 schools, ranging in age from 13 to 18, were included in the study: 18 schools from DEED (50%), and 18 schools from DWED (50%); according to sex: 12 male schools, 12 female schools, and 12 mixed schools. All regular students in grades 7–12 for the academic year 2023–2024 who fall within the age range of 13–18 years old were included. Students with chronic illnesses were excluded, plus adolescents who declined to take part in the research. Three-stages multi-stage random sampling technique was employed to choose the target population. First stage: At the time of the study, Duhok City had a total of 18 schools in the DEED and 18 schools in the DWED, which is the number of intermediate and high schools. 36 schools were chosen at this stage based on two primary criteria. Using a simple random sampling approach, classes within each institution were chosen. When there were many classes in an intermediate school grade (7-9) or a high school grade (10–12), only one class was chosen to represent the grades; at the end, three classes were chosen to represent the grades. Based on a person's height and weight, the BMI calculates his/her body fat percentage. A person's weight in kilos divided by their height in meters squared yields the result (Chambale, 2022). Students who fall below the 5th percentile are considered underweight, those who fall between the 5th and 85th percentiles are considered normal weight, those who fall between the 85th and 95th percentiles are considered overweight, and those who fall between the 95th and 95th percentiles are considered obese (Moya, 2023). Data were collected by (Chnar A. Hamid, Adar R. Hadi, Shrivani M. Kalid, Khatab R. Ahmed, Aya A. Younis) So all thanks to them.

3. RESULTS

Fifty percent of the 250 participants were males. The commonest age group was 18–16 (76%), followed by 17–18 (29.8%). Mothers (26%) are roughly twice as likely as fathers (13.2%) to be illiterate. Fathers also had greater education or degrees than mothers, and 80% of students’

mothers were housewives. In regard to family history of obesity, this study found that 46.2% of students have positive one-parent or both-parent obesity. The majority of students have a moderate economic status (88.2%), as shown in Table 1.

Table 1. Distribution of the study sample by sociodemographic characteristics.

Sociodemographic characteristics	No.	Percentage	Mean (SD)
Age group		Rate of Adherence to Hand Hygiene	
13-14 years’ old		79.90	33.66
15-16 years’ old		75.71	9.23
17-18 Years Old	163	69.60	20.64
188		79.34	12.20

149	32.6	74.14	24.04
37.6		68.44	13.09
29.8	15.4(1.64)	70.30	17.60
		77.93	9.31
Sex		67.06	23.84
Male		73.13	22.35
Female	250	63.20	58.87
250	50.0	70.25	41.46
50.0		75.97	28.76
Educational level		72.69	22.72

The BMI status of the students is displayed in Figure 1, as 48% normal, 23% overweight, 15.6% obese, and 13.4% underweight.

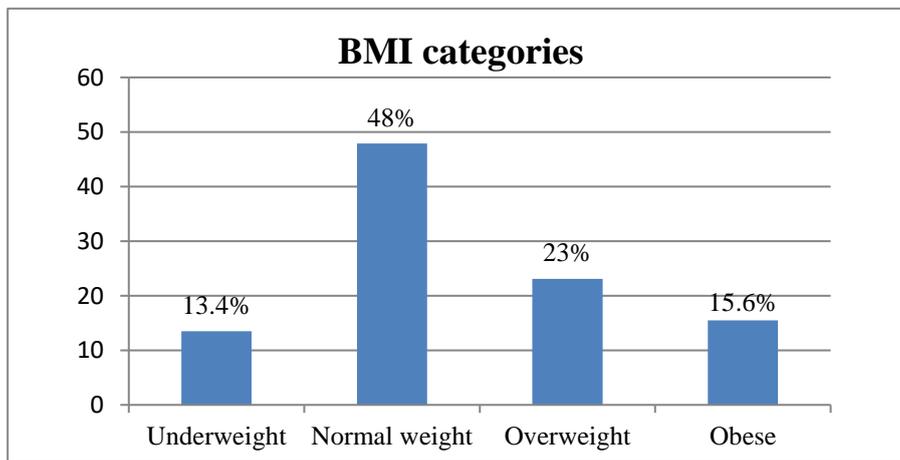


Figure 1. Prevalence of the overweight and obesity among participants.

Figure 2 shows the distribution of students by waist circumference, which range from 0.4% for very high waist circumference, to 55% for very low waist circumference.

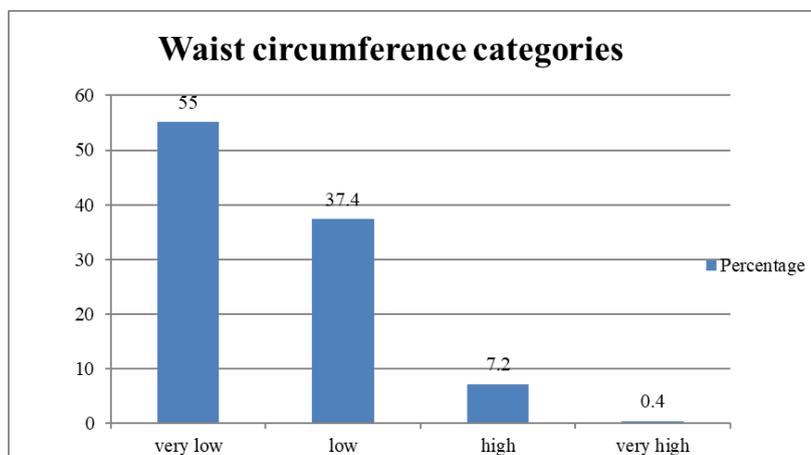


Figure 2. Distribution of the waist circumference among the students.

Seventy-six percent of the students eat breakfast, 82.2% eat dinner before eight o'clock in the evening, and 47% of students eat three meals a day. About 30% of the students use to talk while they were eating, 79.4% use dairy products, 94.2% include fruit and vegetables in their regular diet, 55.6% eat fast food twice a week, 54.6% eat 1-2 snacks every day, 38.6% drink energy drinks, and 66.8% drink fizzy drinks (cola, cream soda) 3-4 times a week, as shown in Table 2.

Table 2. Dietary habits of the students

Dietary habits items	Categories	No.	Percentage
Meals per day	2 meals	221	44.2
	3 meals	235	47.0
	More than 3 meals	44	8.8
All food kinds	Yes	326	65.2
	No	174	34.8
Dinner time	Before 8	401	80.2
	After 8	99	19.8
Breakfast	Yes	380	76.0
	No	120	24.0
Diary product	Yes	397	79.4
	No	103	20.6
Fruit vegetable per day	Yes	471	94.2
	No	29	5.8
Fast foods per week	Do not eat	50	10.0
	2 times	278	55.6
	3 times	110	22.0
	4 times	62	12.4
Snack daily	Do not eat	26	5.2
	1-2 times	273	54.6
	3-4 times	164	32.8
	up to 5 times	37	7.4
Energy drinks weekly	Yes	193	38.6
	No	307	61.4
Fizzy drinks weekly	Never consume	78	15.6
	1-2 times	88	17.6
	3-4 times	334	66.8
Activity while eating	Watch TV	44	8.8
	Talking	149	29.8
	Mobile/iPad use	128	25.6
	None	179	35.8
Total		500	100

Table 3 shows that 64.8% of the students skip meals when they are stressed or angry. Of all the students, 70.4% do not feel they are obese, and 86.6% do not feel depressed because they are overweight.

Table 4. demonstrates that 40% of the students had a high degree of knowledge.

Table 3. Attitude toward obesity

Items	No.	Percentage
Do you eat when are stressed, angry?		
Yes	176	35.2
No	324	64.8
Do you feel that you are obese?		
Yes	148	29.6
No	352	70.4
Do you ever feel sad because you being overweight?		
Yes	67	13.4
No	433	86.6

Table 4. Degree of knowledge among the students

knowledge levels	No.	Percentage
Low	145	29
Moderate	155	31
High	200	40
Total	500	100

Table 5 demonstrates a significant association ($p= 0.005$) between age groups and BMI status, but there is no association between sex and BMI ($p= 0.104$).

There is a significant association between students' BMI and their educational level. BMI status is not associated with the type of family, the educational attainment of the parents, daily activity, or emotional eating behavior. Highly significant association is present between BMI and family history of obesity.

Table 6 indicates a highly significant correlation ($p < 0.001$) between the BMI status of students and their knowledge levels.

Table 5. Relationship between BMI status and sociodemographic characteristics

Factors	BMI				P value
	Underweight	Normal weight	Overweight	Obese	
Age groups					
13-14 years' old	35(21.5)	75 (46)	33(20.2)	20(12.3)	0.005
15-16 years' old	19(10.1)	100(53.2)	40(21.3)	29(15.4)	
17-18 Years Old	13(8.7)	65(43.6)	42(28.2)	29(19.5)	
Sex					
Male	37(14.8)	128(51.2)	55(22.0)	30(12.0)	0.104
Female	30(12)	112(44.8)	60(24.0)	48(19.2)	

Educational levels					
Intermediate	46(18.5)	112(45.2)	57(23)	33(13.3)	0.007
High school	21(8.3)	128(50.8)	58(23)	45(17.9)	
Family type					
Nuclear	50(12.5)	206(51.4)	86(21.4)	59(14.7)	0.09
Extended	16(17.4)	33(35.9)	26(28.3)	17(18.5)	
Single	1(14.3)	1(14.3)	3(42.9)	2(28.6)	
Father education					
Illiterate	7(10.6)	32(48.5)	18(27.3)	9(13.6)	0.28
Write and read	13(8.7)	74(49.3)	38(25.3)	25(16.7)	
School certificate	32(18.8)	75(44.1)	33(19.4)	30(17.6)	
College certificate	15(13.2)	59(51.8)	26(22.8)	14(12.3)	
Mother education					
Illiterate	20(15.4)	57(43.8)	31(23.8)	22(16.9)	0.65
Write and read	16(11.0)	72(49.3)	34(23.3)	24(16.4)	
School certificate	22(14.5)	68(44.7)	38(25)	24(15.8)	
College certificate	9(12.5)	43(59.7)	12(16.7)	8(11.1)	
Family history of obesity					
Close blood relative	29(12.6)	89(38.5)	64(27.7)	49(21.2)	< 0.001
No one	38(14.1)	151(56.1)	51(19)	29(10.8)	
Daily exercise					
15-30 minutes	47(14.2)	160(48.5)	76(23)	47(14.2)	0.18
30-45 minute	16(11.5)	59(42.4)	35(25.2)	29(20.9)	
up to 1 hour	4(12.9)	21(67.7)	4(12.9)	2(6.5)	
Eat when stress					
Yes	28(15.9)	84(47.7)	44(25)	20(11.4)	0.18
No	39(12.0)	156(48.1)	71(21.9)	58(17.9)	
Activity during eating					
Watch TV	6(13.6)	24(54.5)	8(18.2)	6(13.6)	0.3
Talking	27(18.1)	65(43.6)	34(22.8)	23(15.4)	
Mobile/iPad use	8(6.3)	69(53.9)	29(22.7)	22(17.2)	
None	26(14.5)	82(45.8)	44(24.6)	27(15.1)	
Socioeconomic status					
High	9 (14.8)	34 (55.7)	11 (18)	7 (11.5)	0.24
Moderate	50(12.4)	187 (46.5)	101 (25.1)	64 (15.9)	
Low	8 (21.6)	18 (48.6)	4 (10.8)	7 (18.9)	

Table 6. BMI status of students by their knowledge level

Knowledge level	BMI				P value
	Underweight	Normal	Overweight	Obese	
Low	14(9.7)	42(29)	50(34.5)	39(26.9)	< 0.001
Moderate	19(12.3)	82(52.9)	33(21.3)	21(13.5)	
High	34(17)	116(58)	32(16)	18(9)	

4. DISCUSSION

Adolescence is a pivotal time in the development of obesity and the basis of lifestyle disorders. According to this survey, overweight students (23%) and obese students (15.6%) are more common in secondary and high schools (Barnes, 2021). The age group of fifteen constitutes the highest proportion of the study sample, with about 56.6% of the participants being female. Compared to our findings, Aldulaylan (2016) discovered that women comprised 56.2% of the study sample at two secondary schools in Saudi Arabia, with the greatest age group (21.6%) being 14 years old. Alemu et al. (2014) discovered that 54.9% of the study sample in another study of high school students in the Arada sub-city, Ethiopia, were female, and 63.9% were in the 17–19 age range. According to the UNICEF and WHO, (2020), the survey found that approximately 26.0% of the mothers were illiterate. This is higher than the 31% of illiterate women found in the Duhok Province Multiple Cluster Indicator Survey 6 (MICS6), which was carried out in 2018 in Iraq. This result was in line with research done in Duhok, Iraq, by (Alsaeed and Khaleel, 2022) where the fathers of the study participants were literate. However, a study conducted by (Menor-Rodriguez et al, 2022) in Granada differed from the results of the current study, which showed that the majority of the pupils' parents had finished six years of secondary school as a percentage (31.9%). Additionally, research conducted in Duhok, Iraq by (Al-brefkani et al, 2021) revealed that almost 50% of dads had completed intermediate education. Regarding the current study's findings, the percentage of students who regularly ate three meals each day was 39.5%, compared to 47% of the students who reported doing so. Eating three meals a day could provide children with the chance to maintain a balanced nutritional status and overall well-being. Furthermore, the results are consistent with the findings of the study conducted by (Alemu et al, 2014). 65.2% of students' report eating meals of all kinds. This result is consistent with research conducted in Finland by Eloranta et al, (2011), which highlighted that a higher percentage of students—45% of boys and 34% of girls—consume all three main meals each day. They discovered that cutting back on daily meals is generally not a good idea since it prevents the body from getting the right amounts of calories. As a result, the body gets all the nutrients and vitamins it needs when eating the three main meals—breakfast, lunch, and dinner. Concerning dinner meal eating habits, the current study found that the majority of students (82.9%) have them and just 17.1% skip them. Of them, 80.2% eat supper before 8 p.m. and 19.8% after 8 p.m. The results of Johnson et al, (2020) study, which showed that a larger proportion of teenage school pupils (86%) routinely ate their supper meals, lend support to this. According to this study, students who have a positive family history of obesity—whether it be from their mother, father, or both—are more likely to be overweight or obese than other students. Numerous other studies regard parents who are overweight or obese to be risk factors for their offspring's overweight or obesity.

5. CONCLUSIONS

In Duhok City, the prevalence of obesity was 15.6% and overweight was 23% among secondary and high school students. The majority of students had normal BMI. Just 0.4% of students had very high waist circumferences, compared to the majority of 55% who had very low ones. There was a significant link between student knowledge and BMI and between BMI and a family history of obesity. No relationship was found between BMI and sex or between BMI and engaging in regular physical activity.

Health centers have to offer educational seminars to families on good food plans, the risks of obesity, the advantages of regular exercise, and the role of parents and the community in the management of students with eating disorders and abnormal growth measurements. Yearly holiday meetings are needed to enhance parental control over their adolescent's food choices and to encourage parents to set a good example for their children by adopting healthy lifestyles, that include family-friendly, safe physical activities for families. School-based health education programs are needed to increase dietary awareness and promoting students' healthy habits.

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