

Overweight/obesity and its association with physical activity among intermediate school students in Baghdad- Al-Karkh

Hussein Ali Najj^a, Waleed Arif Tawfeeq Al-Ani^b, Besma Mohamad Ali^c

ABSTRACT

INTRODUCTION: Childhood and adolescent obesity is a serious public health problem, and the prevalence of obesity has almost tripled since 1975.

OBJECTIVE: To estimate the prevalence of overweight/obesity among secondary school students in Baghdad/ Al-Karkh and determine the association of socioeconomic characteristics with overweight/obesity.

METHODS: A cross-sectional study was conducted in 34 secondary schools (17 schools for boys and 17 for girls) in Baghdad/ Al Karkh. Data was obtained from students from each school. Students of each class filled out the questionnaire, and then the researcher measured their weight and height. BMI for age z score was calculated by the scientific application program (WHO AnthroPlus), which was obtained from the WHO website. All data entry and data analysis were performed using the Statistical Package of Social Sciences (SPSS V 28).

RESULTS: The prevalence of overweight in the sample was 629 (29.38%), and the prevalence of obesity was 372 (17.38 %). Of the total overweight/obese students, 517 (51.6%) were males. We found a statistically significant association for BMIz with the following variables: 12-year-old age (P=0.001), first grade (0.001), high education of the parents (P=0.001), low rank of the student in the family (P=0.002), no family history of obesity (P=0.001), no history of childhood obesity (P=0.001), no satisfaction with own weight (P=0.001), no mother physical activity (P=0.013), watching TV in the last week of non-school days (P=0.043), playing video games in school days (0.007) and in non-school days (0.001). Reasons for doing physical exercise, and its duration per day and week and with whom were significantly associated with body weight, with p-values of 0.001, 0.001, 0.002, and 0.001, respectively.

CONCLUSION: Overweight and obesity are common among students of intermediate schools in Al-Karkh district of Baghdad in both males and females, male gender, 12 years old and in the first grade, high education of the parents, hours daily spent on social media, internet and digital games, low physical activity, and presence of a family history of obesity were all factors associated with obesity.

Key words: Overweight, obesity, adolescent, physical activity, BMIz.

INTRODUCTION

WHO defines overweight and obesity as “abnormal or excessive fat accumulation that presents a health risk”.^[1] Physical activity is “Any bodily action performed by skeletal muscles that results in caloric expenditure”. In other words, physical activity encompasses any activity that consumes energy, regardless of its scale. One type of physical activity is exercising.^[2]

The beginnings of puberty’s physical changes, which can occur as early as ten years old but often between 12 and 14, mark the beginning of early adolescence. According to research, middle adolescence occurs between the ages of 14 and 17 and late puberty between 17 and 20.^[3]

The Eastern Mediterranean has a large population of young people; in fact, the majority of Arabs (54 per cent) are under the age of 25

a: MBChB, MSc, CABMS (CM). Community physician. Public Health Directorate, Ministry of Health, Baghdad, Iraq. **b:** MBChB, MSc, PhD. Professor Community Physician. Al-Mustansiria University, Department of Community Medicine, Baghdad, Iraq. **c:** MBChB, FIBMS/CM. Community physician. Ghazy Al-Hariri Hospital, Medical City, Ministry of Health, Baghdad, Iraq.

Corresponding Author: Hussein Ali Najj, E mail: husseinalinajj@gmail.com.

years. According to demographic projections for 2018, Iraq's teenagers (10 –19 years old) made up 23% of the country's overall population.^[4]

The prevalence of obesity has nearly tripled since 1975. The Middle East and North Africa (MENA) region, according to a systematic study on juvenile obesity published in 2017, Egypt, Kuwait, Lebanon, Syria, and Saudi Arabia, experienced the highest prevalence of overweight children and adolescent men, ranging from 28.2 to 19.5 per cent.^[5] In Iraq, a Ministry of Health survey conducted in 2006/2007 stated that the prevalence of overweight and obesity was 47 % - 67 %.^[6] In a 2015 poll, 65.4 % and 33.5 % were overweight and obese, respectively.^[7]

A representative longitudinal study from the Kaunas region in Lithuania found that many teenagers were inactive, and sedentary teenagers became inactive adults. In light of this, empirical data reveals that infancy is the starting point for the issue of insufficient physical exercise.^[2]

Childhood obesity was particularly prevalent in urban areas and among the higher socioeconomic categories in several Middle Eastern countries. The leading causes of childhood obesity are sedentary lifestyles, a lack of physical activity, and a preference for high-calorie foods.^[8]

Recently, obesity and overweight among secondary school students have been major public health issues in Iraq and gained attention. Studying the impact of physical activity, sedentary life, and eating habits is essential to designing strategies to overcome this looming threat to children's health. So, this study was designed to measure the prevalence of overweight and obesity among secondary school students in Baghdad/ Al-Karkh and to determine the impact of the students' and parental socioeconomic characteristics on the development of overweight and obesity.

METHODS

Setting and study design: A cross-sectional study was conducted at 34 secondary schools, 17 for boys and 17 for girls, in Baghdad / Al-Karkh for three months from 2021-2022; data was obtained from selected students from each school.

Ethical consideration: The committee of research ethics in the Al-Karkh Health Directorate approved the protocol of this study according to the Ministry of Health's code of ethics in research. The Ministry of Education and the administration of the selected schools agreed to allow the authors to conduct the study at the selected schools. Responses of the students' parents were considered verbal informed consent for participation in the study after explaining the nature and objectives of the study and assuring them that the participation was voluntary. All data were kept confidential.

Enrolment criteria, inclusion and exclusion: All students of the 1st, 2nd, and 3rd grades of both sexes in the selected secondary schools in Baghdad/ Al-Karkh were enrolled in this study. Students who had physical or metabolic limitations that affected their performance or those whose parents refused to participate were excluded from the study.

The sampling method used: We used a multi-stage random sampling to select our sample as follows:

1. Baghdad has two districts, Al-Karkh and Al-Rasafa. Al Karkh Districted was selected randomly.
2. Al-Karkh Education Directorate has three regions: AL-Karkh-1 contains 107 secondary schools, Al-Karkh-2 contains 151, and Al-Karkh-3 contains 110; all regions were included.
3. We randomly selected 10% of the secondary schools from each region; 50% were for boys and 50% for girls. Accordingly, we selected ten from Al Karkh -1, 14 from Al Karkh -2 and 10 from Al Karkh -3.
4. From each selected school, we randomly chose one classroom from each stage from 1st to 3rd.
5. All students of the selected classroom were

enrolled in the study. At the time of collecting data, due to restrictions imposed by authorities because of the COVID-19 pandemic, each classroom had only about 15-20 students.

The questionnaire form: The authors designed the questionnaire form used in this study. The forms were distributed among the students by the interviewer, who explained how to fill them out. Students were asked to fill out the form during a regular class period with the help of the reviewer.

The questionnaire form consists of three sections: the first was to provide sociodemographic characteristics of the students. The second was to provide the physical activity status of the students, while the third included weight and height measurements done by the interviewer to calculate BMI. The weight was measured in kilograms with an accepted error of 0.1 kg using the UNICEF Electric Scale, UNISCALE 890. During weight measurement, students were barefooted with minimal clothes. Height was measured with a standard measurement tape (anthroflex No. 26SM) by Nutri-Activa up to 2 meters.

The questionnaire included three parts. The first was to provide sociodemographic features of the students. The second was to collect data about the type and size of the family and the rank of the student in the family. The third was to collect data about the mother and father's education level, work status, and physical activities. The fourth part included data about the different sedentary and physical activities the students do with data about the way the students practice the exercises. A family is classified as nuclear if it includes only the parents and their children. When the grandparents or other relatives live in the nuclear family, we label them extended families.

Outcomes and procedure: BMI for age z score was used to estimate whether the student is obese, overweight or normal using the WHO method. Students were categorized into:

1. Underweight and wasted with a z score below -2
2. Normal with z score -2 to +1

3. Overweight with z score +1 to +2

4. Obese with z score above +2

BMI for age z score was calculated by the scientific application program (WHO AnthroPlus) obtained from the WHO website. ^[10]

Statistical analysis: Statistical Package of Social Sciences was used for all data entry and analysis (SPSS V 28.). Tables and graphs were used to summarize and convey the study's key findings, along with insightful commentary and suggestions.

We divided the sample into students with normal body weight, including 1099 students, and students with abnormally high body weight, including 1001 students. Those who were underweight, 41 students, were excluded from the subclass analysis.

The Pearson Chi-square test (2-test) was used to assess the impacts of independent variables (15 socioeconomic variables, 16 students' physical activity variables) on the dependent variable (overweight/obesity). We considered a p-value of 0.05 or less as statistical significance.

RESULTS

The total number of students included in the analysis was 2141. Of them, 629 (29.38 %) were overweight, 372 (17.38 %) were obese, and 41 (1.9%) were underweight. Out of the obese students, 396 (39.6%) were at the age of 12 years, 413 (41.2 %) were in the first grade, 517 (51.6 %) were male, and 543 (54.2 %) were living in a rural area. A statistically significant association was found between overweight/obesity and stage and the student's age (p-value = 0.001 for both). For other associations, see [table 1](#).

Table 2 shows the distribution of mothers' and fathers' educational levels and their work status among normal weight and overweight/obese groups. Only the mother's educational level has a statistically significant association with the BMI of the students (p-value = 0.001).

Table 1 | Distribution of the studied sample by class of student, gender & residency and overweight/obesity

		Normal weight		Overweight/obese		P value
		No.	%	No.	%	
Age (years)	11	20	1.8	22	2.2	0.001*
	12	396	36.0	396	39.6	
	13	367	33.4	318	31.8	
	14	316	28.8	265	26.4	
Gender of student	Female	570	51.9	484	48.4	0.108
	Male	529	48.1	517	51.6	
Residency of student	Rural	595	54.1	543	54.2	0.961
	Urban	504	45.9	458	45.8	
Stage of student	First	419	38.1	413	41.2	0.001*
	Second	368	33.5	332	33.2	
	Third	312	28.4	256	25.6	
Total		1099	100	1001	100	

*Significant difference between percentages using Pearson Chi-square test (X^2 -test) at 0.05 level.

We found that 679 (67.8%) of the overweight/obese students were living in nuclear families. On the other hand, 762 (69.3%) of the normal-weight students live in nuclear families. Family size of 5 persons was the most commonest in both normal weight and overweight/obese groups, 389 (35.4%) and 339 (33.9%), respectively. However, the type and size of families were not significantly associated with BMI.

Most overweight/ obese and normal-weight students were the first rank in the family, 327 (32.7%) and 413 (37.6%), respectively. This difference was statistically significant (p-value = 0.002). See [table 3](#)

[Table 4](#) shows the fathers' and mothers' physical activities, the frequency of performing them, and their effect on the student's BMI.

Table 2 | Distribution of the studied sample by educational levels and occupations of the parents and overweight/obesity

		Normal weight		Overweight/obese		P value
		No	%	No	%	
Educational level of the father	Illiterate	6	0.5	20	2.0	0.266
	Read & write	17	1.5	39	3.9	
	Primary school	65	5.9	73	7.3	
	Secondary school	150	13.8	171	17.1	
	Institute, College & above	861	78.3	698	69.7	
Educational level of the mother	Illiterate	9	0.8	21	1.2	0.001*
	Read & write	22	2.0	59	3.3	
	Primary school	54	4.9	108	6.1	
	Secondary school	247	22.5	376	21.3	
	Institute, College & above	767	69.8	1205	68.1	
Occupation of the father (working status)	Worker	123	11.2	90	9.0	0.092
	Employed	738	67.1	663	66.2	
	Others	238	21.7	248	24.8	
Occupation of the mother (working status)	Housewife	576	52.4	530	52.9	0.740
	Employed	516	47.0	467	46.7	
	Others	7	0.6	4	0.4	
Total		1099	100	1001	100	

*Significant difference between percentages using Pearson Chi-square test (X^2 -test) at 0.05 level.

Table 3 | Distribution of the studied sample by type of family, family size and rank of the students and overweight/obesity

		Normal weight		Overweight/obese		P value
		No	%	No	%	
Type of family	Nuclear	762	69.3	679	67.8	0.458
	Extended	337	30.7	322	32.2	
Family size	3	36	3.3	45	4.5	0.305
	4	178	16.2	189	18.9	
	5	389	35.4	339	33.9	
	6	262	23.8	219	21.9	
	7	154	14.0	126	12.6	
	≥ 8	80	7.3	83	8.2	
Rank of the student in the family	1	413	37.6	327	32.7	0.002*
	2	259	23.6	193	19.3	
	3	203	18.4	228	22.8	
	4	124	11.2	154	15.4	
	≥ 5	100	9.2	99	9.8	
Total		1099	100	1001	100	

*Significant difference between percentages using Pearson Chi-square test (X²-test) at 0.05 level.

The mother’s physical activity, rather than of the father, was statistically associated with the BMI of the students (p-value = 0.0013 and 0.021).

Table 5 shows different sedentary and physical activities distributed among normal-weight and overweight/obese students. Watching TV on non-school days and playing video games in school and non-school days were statistically significant for being normal weight or overweight/obese (p-values = 0.043, 0.007, and 0.001, respectively).

Table 6 shows the characteristics of the physical activities the students practised, like duration and frequency of the exercises, the place of doing them and with whom, the time of day for practice, and why the students exercised. Duration of exercising in minutes, its frequency, with whom, and the reasons for doing exercise showed a statistically significant association with being normal or overweight/obese (p-values of 0.001, 0.002, 0.001, 0.001, respectively).

Table 4 | Distribution of the studied sample by Physical activity of the parents and overweight/obesity

		Normal weight		Overweight / obese		P value
		No	%	No	%	
Father physical activity (walking, bicycling)	Yes	568	51.7	478	47.8	0.072
	No	531	48.3	523	52.2	
Father physical activity frequency	Once per month	96	16.9	81	16.9	0.256
	Once per week	276	48.6	210	43.9	
	Daily	196	34.5	187	39.1	
Mother physical activity (walking, bicycling)	Yes	495	45.0	418	41.8	0.013*
	No	604	55.0	583	58.2	
Mother physical activity frequency	Once per month	119	24.0	81	19.4	0.021*
	Once per week	211	42.6	184	44.0	
	Daily	165	33.3	153	36.6	
Total		1099	100	1001	100	

*Significant difference between percentages using Pearson Chi-square test (X²-test) at 0.05 level.

Table 5 | Distribution of the studied sample by Watching TV, Playing video games , transportation to school and to other places and overweight/obesity

		Normal weight		Overweight /obese		P value
		No	%	No	%	
Watching TV in school days	Never	483	43.9	445	44.5	0.756
	Less than 1 hour	330	30.0	301	30.1	
	1 hour and more	286	26.1	255	25.4	
Watching TV in non-school days	Never	238	21.7	237	23.6	0.043*
	Less than 1 hour	259	23.5	255	25.5	
	1 hour and more	602	54.8	509	50.9	
Playing video games in school days	Never	325	29.6	235	23.5	0.007*
	Less than 1 hour	265	24.1	270	27.0	
	1 hour and more	509	46.3	496	49.5	
Playing video games in non-school days	Never	92	8.4	82	8.3	0.001*
	Less than 1 hour	132	12.0	121	12.0	
	1 hour and more	875	79.6	798	79.7	
Transportation to school by Motor vehicle	Not at all	78	7.1	111	11.1	0.105
	1 hour and more	89	8.1	71	7.1	
	Less than 1 hour	932	84.8	819	81.8	
Transportation to school by bicycle at least for 10 minutes	Not at all	1079	98.2	966	96.5	0.130
	1 hour and more	7	0.6	5	0.5	
	Less than 1 hour	13	1.2	30	3.0	
Transportation to school by walking at least for 10 minutes	Not at all	988	89.9	895	89.4	0.512
	1 hour and more	12	1.1	7	0.7	
	Less than 1 hour	99	9.0	99	9.9	
Transportation to other places by Motor vehicle	Not at all	191	17.4	159	15.9	0.503
	1 hour and more	348	31.6	337	33.7	
	Less than 1 hour	560	51.0	505	50.4	
Transportation to other places by bicycle at least for 10 min	Not at all	1038	94.4	928	92.7	0.196
	1 hour and more	16	1.5	15	1.5	
	Less than 1 hour	45	4.1	58	5.8	
Transportation to other places by walking at least for 10 min	Not at all	912	83.0	857	85.6	0.237
	1 hour and more	42	3.8	35	3.5	
	Less than 1 hour	145	13.2	109	10.9	
Total		1099	100	1001	100	

*Significant difference between percentages using Pearson Chi-square test (X^2 -test) at 0.05 level.

DISCUSSION

In 2016, about 340 million children (5–19 years) worldwide were overweight/ obese. In 1975, only 4% of children and adolescents aged 5 to 19 years were overweight; by 2016, that number had risen to 18%. Overweight girls made up 18% of the population; on the other hand, overweight guys made up 19%. Similarly, in 1975, the prevalence of obesity in 5 to 19-year-old children and adolescents was less

than 1%. Obesity rates among boys and girls grew to 8% and 6%, respectively, in 2016.^[10]

Our study found that the prevalence of overweight was 29.38 %, of obesity was 17.38, and of overweight/obesity was 46.76%. Many studies in Iraq have measured these prevalences. Obesity was present in 7.07 % of students in Falluja 2013^[11] and 22.3 % in Kirkuk.^[12] In Al-Diwaniya 2016, the prevalence of overweight/obesity was 41.2%.^[13]

Table 6 | Distribution of the studied sample by duration, total Frequency, Place, time, reasons of Physical exercise and overweight/obesity

		Normal weight		Overweight / obese		P value
		No	%	No	%	
Total minutes per each session of physical exercise	None	68	6.2	60	6.0	0.001*
	30 and less	490	44.6	511	51.0	
	31-60	536	48.7	420	42.0	
	More than 60	5	0.5	10	1.0	
Total Frequency of Physical exercise						
(Per week)	None	68	6.2	60	6.0	0.002*
	Less than 3	457	41.6	477	47.7	
	3 and more	574	52.2	464	46.3	
Place of Physical exercises	Home	587	53.4	555	55.4	0.744
	School	262	23.8	231	23.1	
	Other places	92	8.4	87	8.7	
	Public parks or streets	83	7.6	72	7.2	
	Sport centers or clubs	75	6.8	56	5.6	
With whom?	Alone	568	51.7	455	45.5	0.001*
	Relatives	149	13.6	232	23.2	
	Friends	182	16.6	177	17.7	
	School colleagues	149	13.6	103	10.3	
	Others	51	4.6	34	3.4	
Time of day to do Physical exercises	Morning	258	23.5	195	19.5	0.181
	Afternoon	161	14.6	146	14.6	
	after sunset	97	8.8	84	8.4	
	At night	67	6.1	60	6.0	
	No specific time	516	47.0	516	51.6	
Reasons of Physical exercises	Health	451	41.0	383	38.3	0.001*
	Meet with friends	117	10.6	173	17.3	
	Weight reduction	83	7.6	209	20.9	
	As hobby	286	26.0	152	15.2	
	Others	162	14.7	84	8.4	
Total		1099	100	1001	100	

*Significant difference between percentages using Pearson Chi-square test (X²-test) at 0.05 level.

The explanation for our higher prevalence of overweight/ obesity may be due to the presence of socioeconomic and environmental factors that promote obesity in Baghdad than in other cities, like improper food habits and physical inactivity. The sampling methods used in our study and study design may be other causes.

In our sample, 396 (39.6 %) of the overweight/obese students were 12 years old age, and 413 (41.2 %) of them were in the first grade. Similarly, the study in Kirkuk showed the

highest rate was at the age of 13 years, [12] and a study done in Bahir Dar city in Ethiopia found that (17.6%) of overweight and obesity was observed within the age of 10–14 years. [14] This finding could be explained by the persistence of childhood obesity into adolescence.

We found overweight/ obesity was nearly equal in both sexes; 517 (51.6 %) were males and 484 (48.4 %) were females, with a p-value of 0.108. The study from Falluja City in 2013 [9] showed similar results, which were opposite to those found in Baghdad. [15] The difference

could be explained by shifting socio-cultural standards of female living style and increasing the number of private female sports clubs. Increased usage of motor vehicles by men and an unhealthy diet, on the other hand, may explain the rise in obesity among males.

About 543(54.2 %) of the overweight/obese students were living in rural areas. The same was found in Akçadag district of Malatya, Turkey (23.8%).^[16] In contrast, a study in Nepal found that 63.5 % of obese live in urban areas.^[17] More research is needed to determine the effect of the built environment in promoting obesity, which includes limited access to parks, exercise facilities, fewer sidewalks, a lack of public transportation, and few physical education classes.

About the type of families of the overweight/obese students, 679(67.8 %) were nuclear, 339(33.9 %) had five members, and 327(32.7 %) were the first sibling in the family. A study in Mosul City in 2006 found that 72.37 % of overweight/obese students lived in medium-sized families, and 45.56 % of them ranked 4th or above in the family.^[18] Single-family children had much greater nutritional intakes than children with siblings, and mothers with one child are more concerned with convincing their child to eat than mothers of multiple children. The higher occurrence in nuclear households is most likely related to the parents' increased attention and pampering of their children.

Table 4 shows the distribution of parents' education level and work status in overweight/obese students compared to normal-weight students. We can see the differences; however, these differences are statistically non-significant apart from the education level of the mothers. This was similar to a study in 2015 in a Moroccan school.^[19]

A study in Jeddah, Saudi Arabia, found that 75.3 % of overweight children were of unemployed mothers. However, 89.7% of working fathers children were overweight, with 84.7 per cent being obese.^[20]

In Iraq, parents with high education were usually employed and had less time allocated to their children, which could explain the re-

sults of our study.

Concerning the parents' physical activity of the overweight/obese students, 523(52.2 %) mothers and 583(58.2 %) fathers had no physical activity. The same was found in a study done in Central Europe.^[21] Parents are the first role models for their children, who try to imitate and follow their style of living.

In school and non-school days, most of the obese students watch TV and play video games for more than 1 hour. The same was found in Erbil city.^[22] Advancement of technology has shifted entertainment from being mainly TV-based to internet, social media, and cell phones. In our study, 890 (88.9 %) of the overweight/obese students go to school mainly by motor vehicle, and 842 (84.1 %) go to other places by motor vehicle. The same was found in the Moroccan study.^[19]

Out of 1,001 overweight/obese students, only 60 (6 %) had no physical exercises in the last week. Most of those had only short sessions of physical exercise and had three or more times of physical exercises. Most of the studied population had Physical exercises at home, Physical exercises alone, Physical exercises at no specific time, and Physical exercises for health reasons. The same was found in a study done in Baghdad.^[23]

CONCLUSION

Overweight/obesity is common among students of intermediate schools in al-Karkh district of Baghdad. Overweight/obesity was more common in males than females, in 12 years and older than less than 12, and in first grade than other grades. Students who are first siblings, come from big families and have highly educated parents are more prone to be overweight/obese. Those who spend more time watching TV or playing digital games are also more prone to be overweight/ obese than those who spend less time.

REFERENCES

- WHO. obesity overview & definition. 2021; Available from: https://www.who.int/health-topics/obesity#tab=tab_1
- Smetanina N. Overweight and obesity in children and adolescents: etiology, complications and effects of 12-months intervention. 2016. <chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://portalcris.lsmuni.lt/server/api/core/bitstreams/d2054303-bef0-4fcc-93e9-439264e27174/content>
- Damian RI, Robins RW. Self-Esteem Across the Lifespan: Issues and Interventions, edited by Mary H. Guindon. *J Women Aging*. 2011;23(2):177–9.
- Musaiger AO, Al-Hazzaa HM. Prevalence and risk factors associated with nutrition-related non-communicable diseases in the Eastern Mediterranean region. *International journal of general medicine*. 2012;5: 199.
- Farrag NS, Cheskin LJ, Farag MK. A systematic review of childhood obesity in the Middle East and North Africa (MENA) region: Prevalence and risk factors meta-analysis. *Advances in pediatric research*. 2017;4.
- Iraq Family Health Survey Study Group. Iraq Family Health Survey (IFHS) 2006/7. World Health Organization. 2008.
- Ministry of Health of Iraq. Ministry of Planning and Development Cooperation, World Health Organization. Noncommunicable Diseases Risk Factors STEPS Survey Iraq. 2015. Available online: http://www.who.int/chp/steps/Iraq_2015_STEPS_Report.pdf?ua=1 (accessed on 10 October 2020).
- Zhang, YX, Wang ZX, Zhao JS, Chu ZH. The current prevalence and regional disparities in general and central obesity among children and adolescents in Shandong, China. *Int J Cardiol*. 2017 Jan;227:89–93.
- WHO. who anthro plus [internet]. 2020. Available from: <https://www.who.int/tools/growth-reference-data-for-5to19-years/application-tools>
- WHO. WHO | obesity and overweight [internet]. 2020 [cited 2020 Mar 12]. Available from: Available from: <http://www.who.int/mediacentre/factsheets/fs311/en/>.
- Sarhan YT. Effect of Life Style on Weight in a Sample of Early Adulthood from Falluja Secondary Schools. *Anb Med J*. 2013;12:42-52.
- Danok AS, Ghanim Ma'ala E. Prevalence of obesity among adolescents at secondary schools in Kirkuk city. *Iraqi National Journal of Nursing Specialties*. 2013;26(2): 96-101.
- Alkhalidi FA. Overweight and Obesity among Children under 18 year attended Nutritional Clinic in AL-Diwaniyah Governorate, Iraq, 2016. *Thi-Qar Medical Journal*. 2017;13(1):51-8.
- Worku M, Gizaw Z, Kassahun Belew A, Wagnaw A, Hunegnaw MT. Prevalence and Associated Factors of Overweight and Obesity among High School Adolescents in Bahir Dar City, Northwest, Ethiopia: A Cross-Sectional Study. *J Obes*. 2021 Mar 9;2021:8846723. doi: 10.1155/2021/8846723. PMID: 33777450; PMCID: PMC7969120.
- Alkharajy L A. Relationship between screen watching and overweight or obesity in a Sample of Iraqi adolescents. *Al-Kin-di Col Med J* 2013;9(1):80-88.
- Deniz S, Oguzöncül AF. The prevalence of obesity and related factors among primary and secondary school students. *Nigerian Journal of Clinical Practice*. 2019 Dec 1;22(12):1685–92.
- Regmi S, P. J. Overweight and obesity among higher secondary level students of Tulsipur Municipality, Nepal. *International Journal Of Community Medicine And Public Health*. 2018 Jan 24;5(2):774–8.
- Yazin k. ghazala. overweight and obesity among children aged 6-15 years. A dissertation submitted to the scientific council of family and community medicine in partial fulfillment of fellowship of the iraqi commission for medical specializations in family medicine. [baghdad]; 2006.
- El Kabbaoui M, Chda A, Bousfha A, Aarab L, Bencheikh R, Tazi A. Prevalence of and risk factors for overweight and obesity among adolescents in Morocco. *East Mediterr Health J*. 2018 Jul 29;24(6):512-521. doi: 10.26719/2018.24.6.512. PMID: 30079946.
- Mesawa A, Almutairi A, Abdullah A, Kutbi R, Almarri A, Alahdali H, et al. Parental socioeconomic status and occupation in relation to childhood obesity. *International Journal of Medicine in Developing Countries*. 2020;576–85.
- Sigmund E, Sigmundová D, Badura P. Excessive body weight of children and adolescents in the spotlight of their parents' overweight and obesity, physical activity, and screen time. *International Journal of Public Health*. 2020 Nov 1;65(8):1309–17.
- Hussein KA. Obesity and Overweight among Students in Arabic Secondary Schools in Erbil City. *Iraqi National Journal of Nursing Specialties*. 2012;25(2):90-97.
- Ban MK, Nada A. Measuring the level of physical activity and energy spent promoting health in 18-25 years old youth in Baghdad. *Moderan Sport*, 2011;11(17):1-17.

Abbreviations list: Body Mass Index (BMI), Middle East and North Africa (MENA), Statistical Package of Social Sciences (SPSS), World Health Organization (WHO).

Conflict of interest: Author has nothing to declare. **Funding:** Author received no funds to complete this study a part from self funding.