# The Relationship between Obesity and Depression among Adolescents in Al-Karkh Secondary Schools in Baghdad, Iraq 2021

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## ABSTRACT

**INTRODUCTION**: Adolescence obesity imposes short- and long-term morbid effects on health and well-being. Obese children and adolescents are more likely to become obese adults, and they are at greater risk of developing medical, social and psychosocial problems. Studies have also suggested an association between depression in adolescence and higher body mass index (BMI) in adulthood.

**OBJECTIVE**: The objective of this study is to measure the prevalence of obesity and depression and assess the relationship between them among adolescents aged 12 to 18 years in public secondary schools in the city of Baghdad during the educational year 2020-2021.

**METHODS**: A cross-sectional study using multistage random sampling was carried out in Baghdad/ Al-Karkh secondary schools during the educational year 2020-2021 among adolescents aged 12-18 years. The data were analysed descriptively and statistically by Chi-square using SPSS (version 21).

**RESULTS**: The study revealed that the prevalence of overweight among the studied group was 33.9%, and that of obesity was 7.6%, higher in females (46.9%) than males (36%). The association was significant (P= 0.008). The prevalence of depression among the study group was 9.1%, higher in females (14.8%) than males (3.3%). The association was highly significant (P= 0.001).

**CONCLUSION**: Our study shows a statistically significant association between obesity and depression among adolescents in public secondary schools in the city of Baghdad.

**Key words**: Adolescents, Childhood obesity, Childhood depression, Self-esteem.

## INTRODUCTION

Obesity among adolescents has reached epidemic rates worldwide, with the prevalence of severe obesity increasing 4-fold over the last 35 years. Most obese youths carry their excess adiposity into adulthood, which puts them at increased risk for developing obesity-related complications, such as type II diabetes mellitus and cardiovascular disease, and disturbs their social and emotional health.[1] Obesity in children and adolescents is measured by body mass index (BMI), calculated by dividing weight in kilograms by the height in meters squared.[2] Emotional health and well-being of adolescents have implications on self-esteem, behaviour, school attendance, educational achievement, social connectedness and quality of health.[3]

Childhood depression is a major public health concern because of its prevalence, potential for recurrence and impairment of functioning. Early depressive susceptibility is a predictor of depression in adulthood.[4] Depressive disorders occur in about 2% of elementary school children and 4-8% of adolescents.[5] The prevalence increases dramatically throughout adolescence, which can be attributed to pronounced biological and social changes, and it significantly deteriorates the student's performance at school and in daily life.[6] Obesity and depression are more common in adolescents,

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with an increasing likelihood of simultaneous occurrence.[7] This growing vulnerability for the co-occurrence of depression and obesity in adolescence indicates a possible controversial association.[8] Obesity and depression are prevalent health issues affecting adolescents, with significant physical and mental well-being consequences.

The present study aimed to explore the relationship between overweight/obesity and depression among Iraqi adolescents. Understanding the complex interplay between these two conditions is crucial for designing effective prevention and intervention strategies.

## METHODS

**Setting and study design**: An analytical cross-sectional study was performed among adolescents (12-18 years old) in public secondary schools during the educational year 2020-2021.

**Ethical consideration**: Before the start of the study, the protocol was reviewed and approved by the ethical committee of the Scientific Board of Community Medicine, Arab Council for Health Specializations. Permission was taken from the Ministry of Education, Al-Karkh Educational Directorate and the administrations of the six secondary schools enrolled. The parents of children in this study were asked to sign a written consent form before participation. Data collected was kept confidential and was not divulged except for the purpose of the study.

**Inclusion and exclusion criteria**: Students of secondary public schools aged 12-18 years of both sexes were included in this study. We excluded students with underlying metabolic and/or endocrine disease and those who did not provide a consent form signed by family from the study. Ten students refused to participate in this study.

**Sampling and sample size**: We used a multistage random sampling technique to select the sample. The third Al-Karkh educational directorate was chosen randomly from the three

directorates in Al-Karkh district in Baghdad. We randomly selected six secondary schools out of the seventy, three for boys and three for girls, and one class from each stage. Finally, eighty students were chosen from each school by systematic random sampling, approximately 13 from each class. The interval was calculated for each class by dividing the total number of students by the required one and starting the selection from the first students. The sample size was calculated to be 475 students.

**Tools of the study**: The data were collected in two stages; the first stage included measuring the height and weight of the student and then calculating the BMI, and the second stage included a structured questionnaire, which has been edited, reviewed, and revised by an assigned panel of experts to meet the national needs. We applied the questionnaire to 20 students from similar schools to test its feasibility, and their results were not included in the final analysis of this study. Pre-testing the questionnaire helped estimate the time to answer the questions and explore ambiguity. On the day the questionnaire was distributed, students were informed by the school counsellor and the researcher on the nature of the study. They were free to participate or not. Any queries that the students had were answered. On completion, the questionnaire form was folded and placed in a sealed box to ensure confidentiality.

Data were collected in two stages; the first was extracting the BMI by measuring the height and weight of the student, and the second included answering the questionnaire. Each student was measured barefooted, wearing only light clothes. Weight was measured using standardised calibrated scales to the nearest 0.1 kg, and height was to the nearest 0.1 cm using the standardised wall-mounted height boards with a sliding headpiece according to the following protocol: no shoes, heels together, buttocks, shoulders and head touching the vertical wall surface with the line of sight aligned horizontally. Before each measurement, the digital scale was adjusted to zero. BMI was calculated as the weight in kilograms/ squared measured height in meters. The measured BMIs were classified into four categories

according to the World Health Organization: Expert Committee on Physical Status: The use and interpretation of anthropometry. Geneva: WHO; 1995 as follows:

- Less than 18.5 kg/m$^2$ is underweight.
- Between 18.5 and 24.9 kg/m$^2$ is normal.
- Between 25 and 29.9 kg/m$^2$ is overweight.
- BMI 30 kg/m$^2$ or over is obese.

The 1st part of the structured questionnaire revealed information on demographic and socioeconomic variables, eating habits, physical activity and sedentary time. The level of socioeconomic status was measured by the level of parent's education and occupation, and the crowding index that was calculated by dividing the family members by the number of rooms apart from the kitchen and bathrooms. The crowding index was categorised as low when there were two individuals or fewer per room or high when there were more than two per room.[9] Parents' education level was categorised into three groups. Low level of education for those who never attended or attended only primary schools. A medium level of education is assigned for those who attended secondary schools, and high level of education for those attended universities and higher education.

Questions about physical activity included the frequency of participating in sports activities, daily walking distance and means of getting to school (by walking, bicycle or car) during a typical week. Sedentary time was assessed as time spent watching television (hours per day), computer usage (hours per day), time spent playing video games (hours per day), and time spent on social media. The questionnaire also addressed dietary habits, the frequency of missing breakfast and the frequency of consumption of certain types of fast foods, sweets and sugary beverages per week. It also included a question about family history of obesity (maternal, paternal, parental). The 2nd part of the structured questionnaire is concerned with the assessment of depression status according to the validated patient health questionnaire (PHQ-9), which is a multipurpose instrument used for screening, diagnosing, monitoring

and measuring the severity of depression.[10] The patient health questionnaire (PHQ-9) was based on symptoms known to be common among depressed patients. The PHQ-9 scores each of the 9 DSM-IV criteria as "0" (not at all) to "3" (nearly every day). In this study, the Arabic version of (PHQ-9) was used.[11] It takes no more than 5 to 10 minutes to administer and is interpreted as follows: A total score of 1-4, 5-9, 10-14, 15-19, and 20-27 indicates minimal or no, mild, moderate, moderately severe, and severe depression, respectively.

**Data Management**: Before the data entry and analysis, it was checked to ensure it did not contain errors or omissions.

**Data entry**: The checked questionnaire forms were entered into a computer-supported database and statistical software programs using database management analysis software and a spreadsheet (Excel). The data extracted from the summed questionnaires were collected, collated, coded and entered into the SPSS.

**Statistical analysis**: Analysis was carried out using the available statistical package of statistical packages for Social Sciences-version 21 (SPSS 21). Categorical variables were presented in simple frequency, percentages, and proportion. Continuous variables were shown in mean ± standard deviation and the range (minimum-maximum values). We used the Pearson chi-square test to test the association between the dependent and independent variables. We considered a p-value ≤ 0.05 as a cutoff point to define a statistically significant association.

## RESULTS

Four hundred and seventy-five participants were enrolled in this study. The mean age was 15.8 ± 1.6 (range: 12 - 18 years). The mean weight and height were 64.6 ± 10.1 kg and 161.6 ± 5.7 cm, respectively; the mean BMI was 24.7 ± 3.3 kg/m$^2$. Sex distribution revealed an approximately equal number of females and males: 239 (50.3%) and 236 (49.7%), respectively, giving a female-to-male ratio of 1.01: 1.

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**Table 1 |** Some demographic characteristics of the study group according to gender

| Variable | Mean ± S.D | |
|---|---|---|
| | Males | Females |
| Age (years) | 15.8 ± 1.7 | 15.8 ± 1.6 |
| Weight (kg.) | 64.8 ± 11.1 | 64.4 ± 9.1 |
| Height (cm) | 163.04 ± 7 | 160.3 ± 3.7 |
| BMI (kg/m2) | 24.3 ± 3.4 | 25.04 ± 3.2 |
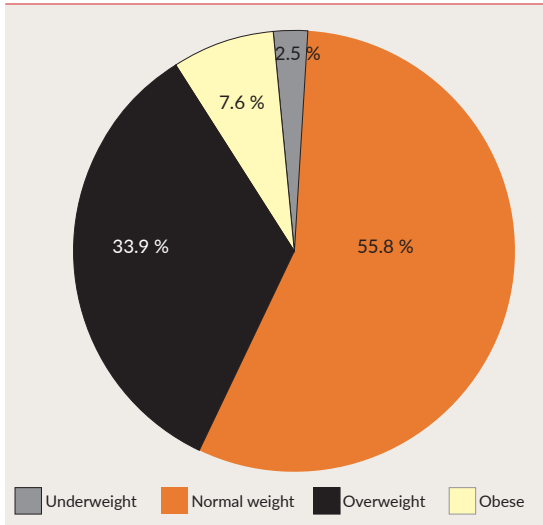


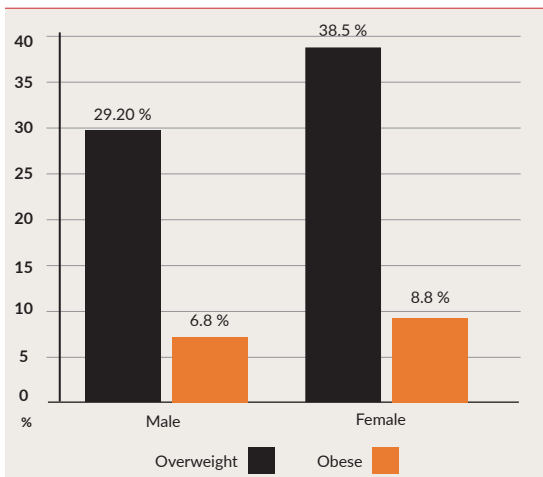**Figure 1 |** Prevalence of overweight and obesity in the study group.



**Figure 2 |** Distribution of overweight and obesity in the study group according to gender.



**Figure 3 |** Grades of depressive symptoms among the study group.
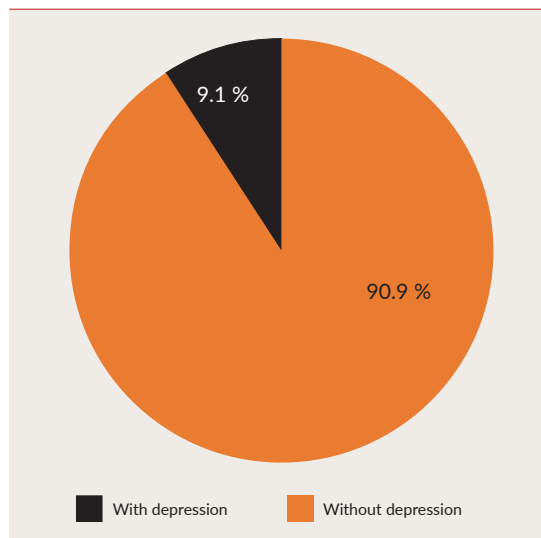


**Figure 4 |** Prevalence of depression in the study group.

**Table 2 |** The distribution of the study group by depression and obesity.

| Variable | Total | | BMI ≥ 25 kg/m$^2$ | | X$^2$, DF, P value |
|---|---|---|---|---|---|
| | No. | % | No. | % | |
| Without depression | 432 | 90.9 | 170 | 39.4 | 10.679, 1, 0.001 |
| With depression | 43 | 9.1 | 28 | 65.1 | |

See **table 1**.

It was revealed that 12 (2.5%) of the students were underweight (BMI ≤ 18.5 kg/m$^2$), 265 (55.8%) of the students were of normal weight (BMI = 18.5 - 24.9 kg/m$^2$), 161 (33.9%) of them were overweight (BMI =25 – 29.9 kg/m$^2$) and 37 (7.8%) were obese (BMI ≥ 30 kg/m$^2$)
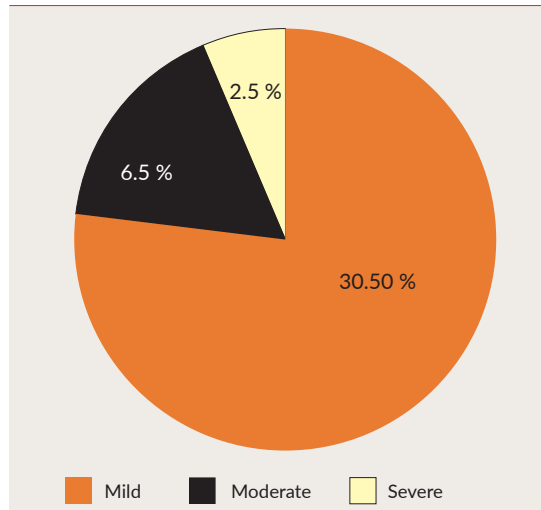
as shown in **figure 1**.

Females were more likely to have a higher rate of obesity than males; the frequency of obesity was 21 (8.8%) in females compared to 16 (6.8%) in males (**Figure 2**). The association was significant (P= 0.008). One hundred and forty-five participants (30.5%) had mild de-

pression, 31 (6.5%) had moderate depression, and 12 (2.5%) had severe depression as shown in Figure 3. Moderate and severe depression combined occurred in 43 (9.1%) participants. The later figure was considered to represent the prevalence of depression among the study group (**Figure 4**). The study explored that the rate of depression was higher among females (14.8%) than males (3.3%). The association was highly significant (P= 0.001).

The present study found a significant association (P= 0.001) between obesity and depressive symptoms among the participants, as shown in **table 2**.

## DISCUSSION

Obesity is a leading cause of preventable diseases and disability worldwide, and depression is a leading cause of disease burden. Both conditions are becoming increasingly common and comorbid. There is strong evidence of a bidirectional association between obesity and depression.[12] In the present study, the prevalence of obesity was 7.6%. It is similar to that reported in Jordan (8.7%)[13] and Syria (11.1%) [14] and higher than that reported in Palestine (3.3%).[15] The observed rate is lower than that reported in the United Arab Emirates (15%)[16] and Saudi Arabia (17.4%).[17] Differences in cultures, environments, and food choices might explain variations in the prevalence of obesity. The fact that Iraq has been open to different aspects of Westernisation and globalisation after 2003 may explain the rise in the number of obese adolescents.[18]

The rates of overweight and obesity were higher in females than males: 38.5% and 8.4% in females compared to 29.2% and 6.8% in males, respectively, with a statistically significant association (P= 0.008). This finding is similar to that reported in Al-Diwaniyah Governorate (in the middle part of Iraq) [19] and Ramadi City (in the western part of Iraq).[20] It is inconsistent with that in Jordan and Lebanon.[21] The variation might be attributed to the domination of the religious style of the female dressing type, which lessens their concern about thinness and diet-

ing.[22] It might also be explained by socio-cultural norms in which plumpness is considered healthy and a sign of beauty and affluence in females. An unhealthy diet and cultural barriers against practising sports might also play a role.

The prevalence of depressive symptoms in our study sample was 39.5%. This finding is similar to that in Malaysia (39.7%)[23] and Qatar (34.5%),[24] but lower than the prevalence rate reported in India (57.7%).[25] Other studies reported a much lower prevalence, e.g. Armenian adolescents (16.7%) with 21% and 6% for females and males, respectively,[26] and Dubai adolescents (17.5%).[27] Our study also shows that depression among adolescent females was more prevalent than among adolescent males, in agreement with that reported in Canada, Great Britain and Eastern Norway.[28, 29]

Our study found a significant association between obesity and depression (P=0.001). The result was consistent with that reported among Swedish[30] and British adolescents. [31] It is inconsistent with that reported among Iranian adolescents; a systematic review and meta-analysis of observational studies showed a positive association between obesity and the risk of body dissatisfaction and low self-esteem among children and adolescents. It is also inconsistent with the cross-sectional study reported among Bangladeshi adolescents.[32]

The positive association between obesity and depression, especially among females more than males among Iraqi adolescents, can be attributed to various cultural, social, and environmental factors. Understanding this association in the context of Iraqi adolescents requires considering the cultural beauty standards that prefer slimmer bodies in females. Cultural beauty standards prioritising thinness can create a sense of body dissatisfaction among adolescent girls who do not meet these standards, potentially leading to depression. In addition, access to healthcare and mental health services may be limited in some regions of Iraq, and there may be a stigma associated with seeking help for mental health issues. This can disproportionately affect females, who might face additional barriers to accessing these services.

Iraq has experienced periods of conflict and instability, and this can lead to chronic stress and trauma. The impact of these stressors may be different for males and females and can contribute to depression, especially when combined with obesity-related challenges.

## CONCLUSION

We found a significant and positive association between obesity and depression, with a higher prevalence and more significant impact observed among females compared to males. Several important implications arise from these findings:

1. It is evident that the cultural, societal, and gender-specific factors unique to the Iraqi context play a crucial role in shaping this association. Cultural beauty standards, gender roles, and expectations contribute to the heightened vulnerability of adolescent girls to both obesity and depression. Weight-based stigma, limited access to mental health services, and the impact of sociopolitical stressors further compound these challenges for females.

2. There is an urgent need for tailoring interventions and support systems targeting female adolescents in Iraq. These interventions should encompass not only physical health but also mental well-being. Promoting positive body image, reducing weight-related stigma, and fostering open dialogue within families and communities are critical steps in addressing the emotional distress associated with obesity among females.

3. The positive association between obesity and depression among Iraqi adolescents, emphasising the disproportionate burden borne by females, needs to be addressed and requires a holistic approach that considers cultural sensitivities, gender-specific support, and community-based strategies to improve the overall well-being of adolescent girls in Iraq.

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