

# Association between Body Mass Index and Depressive Symptoms among Adolescent Females in Baghdad, AlKarkh during 2022

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## Abstract:

**Background:** Due to their high prevalence rates, adolescent obesity and depression are among the most renowned public health concerns globally. Obesity is considered the leading cause of morbidity and death in Iraq in 2019. There is scarce research and surveys regarding the relation between BMI and depression especially in young Iraqi females.

**Objectives:** To explore the level of depression among adolescent girls, and to determine its association with Body Mass Index in the studies group.

**Methods:** Beck's depression inventory questionnaire was used in 11 high schools for girls that were selected randomly from the schools in Baghdad/ AlKarkh from 1st of January 2023 till end of May 2023. A sample of 350 adolescent girls was included in the study. The height and weight of each participant was measured and BMI was calculated. Tables and graphs were constructed to describe the data. The Chi-square test was used to test the association between categorical data. A P value of less than 0.05 was considered as statistically significant.

**Results:** Of the studied group, 14% were underweight, 59% normal weight, 21% overweight and 6% obese. As for mood status, 16% had mild mood disturbance, 24.3% had borderline clinical depression, 13.4% had moderate depression and 3.1% had severe depression. Severe depressive symptoms were found in 15% of obese girls, significantly higher than that among overweight (1.4%), normal weight (2.4%) and underweight (3.4%),  $P = 0.003$ .

**Conclusions:** There was a significant association between obesity and severe depression, and a positive significant correlation between BMI and depression.

**Keywords:** Adolescents, BMI; Obesity; Depressive symptoms; Iraqi girls.

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## Introduction:

Many people feel sad at times, but these feelings usually disappear within a couple of days. When someone has a depressive disorder, it impedes daily life and normal work and affects a person's conduct with family and friends (1). Depression is defined as "a mood state categorized by a sense of inadequacy, a feeling of hopelessness, a decrease in activity or reactivity, negativity, sadness and associated symptoms. It is one of the most common mental health disorders, which is also considered the foremost cause of ill health worldwide (2). Risk factors for depression are female sex, low educational level, low socioeconomic status, comorbid anxiety disorders, family history of depression, personal history of depression, comorbid physical chronic diseases, and exposure to stressful life events (3).

It is believed that 5% of adults worldwide experience depression, which can cause a wide range of mental and physical issues and reduce the capacity to function both at work and at home (4).

According to the 2021 World Health Organization (WHO) report, nearly 322 million people (4.4%) worldwide live with depression (5). According to a recent Iraqi Ministry of Health (MOH) report, 16.5% of Iraqi people older than 15 years of age suffer from psychological diseases.

Depression affects nearly 10.9% of individuals aged 18-25 years (6). Depression can lead to suicide which is the second leading cause of death in young adults (15-29 years old) globally (7).

Obesity is considered one of the non-communicable diseases (NCDs) which were the leading cause of morbidity and death in Iraq in 2019 (8). Overweight and obesity are defined as abnormal or excessive fat accumulation that may impair health (9). Adolescence is the phase of life between childhood and adulthood, from ages 10 to 19. It is a unique stage of human development and an important time for laying the foundations of good health (10). Body image is made in childhood from the interaction with parents, siblings, friends, and schoolmates.

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Hence, whether these interactions were positive or negative will influence on the individual's self-esteem (11). Even though there are many studies on the relationship between obesity and depression, this topic was selected because there is scarce research work regarding the relationship between BMI and depression especially in young Iraqi females.

**Subjects and Methods:**

This Cross-sectional study was conducted in Baghdad in 11 high schools chosen, from Baghdad/ AlKarkh (First and Second Directorates of Education) from 1st of January 2022 till end of May 2023. A multistage random sampling method was used to select a sample of 350 female adolescents (10-12 students were chosen by simple random sampling from each class, from each school).

**Exclusion criteria:** Adolescents who had experienced divorce of parents, remarriage of parents, death in the family, or who have any acute or chronic physical and psychiatric disease.

The data was collected by using the (Beck's depression inventory questionnaire) that was used in previous studies (12), which included 21 questions designed to measure depressive symptoms. The questionnaire was validated by three senior physicians (community medicine, family medicine and a psychiatrist). The researcher visited all the selected schools and a direct interview was made with each selected student, to fill the questionnaire. The height and weight of each student was measured using a weight and height meter (Seca). The BMI was calculated. The girls were grouped according to their BMI to: Underweight, normal weight, overweight and obese. (13)

Approval was obtained from the administrations of the selected schools before starting the data collection. Verbal consent was obtained from each selected student after full clarification of the aims of the study and assuring the confidentiality of the collected data.

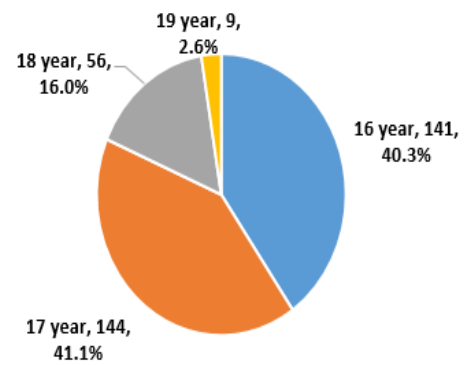
The data were loaded into SPSS V26 statistical programs. Tables and graphs were used for descriptive purposes. The Chi-square test was used to test associations between categorical data. The correlation coefficient was calculated to test its significance between numerical variables. A P value of less than 0.05 was considered significant.

**Results:**

Figure (1) show that 40.3% of the participants were 16 years old, 41.1% were 17 years old, 16% were 18 years old and 2.6% were 19 years old.

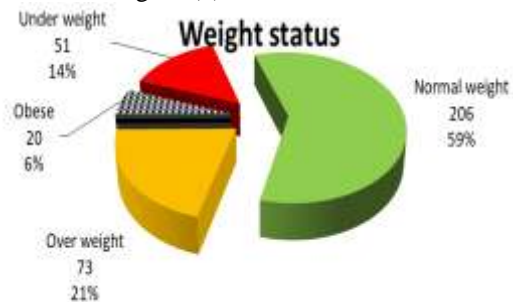
**Table 1: Association between weight status and depressive symptoms**

Weight status	Normal		Mild mood disturbance		Borderline clinical depression		Moderate depression		Severe depression	
	N	%	N	%	N	%	N	%	N	%
Under weight	22	43.1	7	13.7	8	15.7	12	23.5	2	3.9
Normal weight	95	46.1	29	14.1	57	27.7	20	9.7	5	2.4
Overweight	32	43.8	16	21.9	13	17.8	11	15.1	1	1.4
Obese	2	10.0	4	20.0	7	35.0	4	20.0	3	15.0
<b>Total</b>	<b>151</b>	<b>143</b>	<b>56</b>	<b>69.7</b>	<b>85</b>	<b>96.2</b>	<b>47</b>	<b>68.3</b>	<b>11</b>	<b>22.7</b>
<b>P value</b>	<b>0.003</b>									



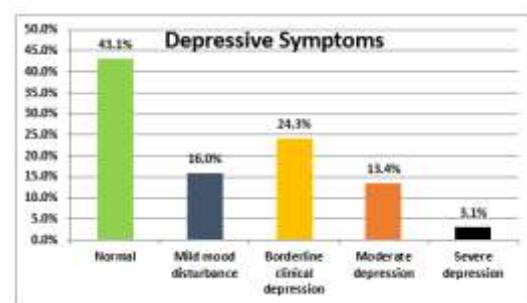
**Figure 1: Age distribution of the studied sample**

The study also shows that 14% were underweight, 59% were normal weight, 21% overweight and 6% were obese, figure (2).



**Figure 2: BMI distribution of the studied sample**

While figure (3) shows that 43.1% of studied students had no depressive symptoms, 16% had mild mood disturbance, 24.3% had borderline clinical depression, 13.4% had moderate and 3.1% had severe depression.



**Figure 3: Distribution of studied sample according to their depressive symptoms**

Table 1 shows that 15% of obese students had severe depressive symptoms which was significantly higher than the rate of severe depressive symptoms among overweight (1.4%), normal weight (2.4%) and underweight (3.4%), P = 0.003.

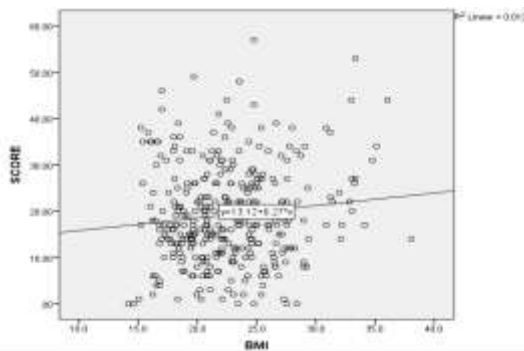
Table 2 shows that there is no significant association between the age of the students and depressive symptoms,  $P = 0.195$ .

**Table 2: Association between age of participants and depressive symptoms**

Age (Years)	Normal		Mild disturbance		Borderline depression		Moderate depression		Severe depression		Total
	N	%	N	%	N	%	N	%	N	%	
16	60	42.6	25	17.7	33	23.4	18	12.8	5	3.5	141
17	64	44.4	22	15.3	40	27.8	13	9.0	5	3.5	144
18-19 *	27	41.5	9	13.8	12	18.5	16	24.6	1	1.5	65
Total	151	143	56	69.7	85	96.2	47	68.3	11	22.7	350
P value	0.195										

because of small number of cases in age 18 and 19 year and for suitable calculation of the chi-square test, cases of these 2 ages were merged in one group

A weakly significant positive correlation was noticed between BMI and depressive symptoms score ( $R = 0.111$ ,  $P = 0.038$ ). (Fig 4).



**Figure 4: Correlation between BMI and depressive symptoms score**

**Discussion:**

Due to their high prevalence, morbidity, and death rates, adolescent obesity and depression are among the most renowned public health concerns globally (14). Therefore, a substantial amount of research has focused on the factors that contribute to the development of obesity and depression.

Results similar to those of our study regarding body weight of adolescent girls were reported by a study from Iran in 2016, where 59.8% of the study sample were of normal weight, 12% overweight and 7.3% obese (15). In a Korean study on adolescents, 58.9% were of normal body weight, 17.0% were overweight and obese and 24.1% were underweight (16).

As for depressive symptoms, the above study from Iran showed that 27.3% were normal with no depressive symptoms, 40.5% had minor depressive symptoms, 19.5% had moderate depression, and 12.8% had major depression (15).

An examination of a cohort of obese patients in the United Kingdom regarding the influence of BMI on depression revealed a stepwise pattern of increasing risk of depression among those with a BMI higher than 30 kg/m<sup>2</sup>, with the risk doubling among those with a BMI greater than 60 kg/m<sup>2</sup> (17). In a study published in 2013 in USA, greater BMI levels were related to depressive symptoms completely through a psychosocial factor; the negative body image (18). The 2016 study from Iran showed that there was a positive and significant connection between BMI and depression among high school female students

(15). A report on the search of three major databases in 2016 showed that overweight and obesity were adversely related to a number of psychiatric comorbidities, including depression (19). A systematic review on the subject in 2017 showed that the majority of cross-sectional researches indicated a strong relationship between obesity and depression (20). Small and Ablasca (2016) acknowledged the ambiguous relationship between obesity and depression. This study revealed a highly significant association between body weight and depressive symptoms, as obese girls report a greater prevalence of severe depression (21). All the above-mentioned studies and reviews are consistent with the results of the current study.

A study from Turkey in 2020 showed no statistically significant association between depression symptoms and the age of the participants (22) similar to our findings. Other variables may influence the relationship between obesity, anxiety, and depression. Low physical activity, an unhealthy diet, and sleep disturbances are some of the confounders for both depression and obesity (23, 24). In addition, obese adolescents are often harassed or bullied because of their weight, which may contribute to anxiety and depression symptoms (25).

Obesity is connected with subclinical systemic inflammation and oxidative stress, which are identified as key etiological components of depression (23). Furthermore, obesity is strongly influenced by genetic factors, with an estimated heritability of 60% regarding BMI. Genetic susceptibility to the common form of obesity appears to be polygenic (27).

Regarding the comparison to Iraqi literature, in 2020, females with a healthy nutritional status were less likely to be depressed, whereas a larger consumption of fatty and unhealthy meals was connected with increased anxiety (28-30).

**Conclusions:** There is a significant association between obesity and depression. A positive and significant correlation between BMI and depression was also noticed.

**Authors' contributions:**

**Dr. Masarrah Muzahim Alkabban:** writing the project, collecting data, writing draft, and research.

**Dr. Lujain Anwar Alkhazrajy:** supervisor, concept of the study, reviewing manuscript

**Conflicts of interests:** No conflicts of interests

**Author Declaration:**

Conflicts of Interest: None.

We hereby confirm that all the Figures and Tables in the manuscript are ours. Authors sign on ethical consideration's approval-Ethical Clearance: The project was approved by the local ethical committee in the Ministry of Health.

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## العلاقة بين مؤشر كتلة الجسم وأعراض الاكتئاب لدى الفتيات في بغداد-الكرخ خلال عام 2022

د. مسرة مزاحم/ دائرة صحة الكرخ / بغداد  
أ.د. لجين انور الخرجي/ كلية طب الكندي / قسم طب الاسرة/ جامعة بغداد  
الخلاصة

**الخلفية:** نظرًا لارتفاع معدلات الإصابة والوفاء، تعد سمنة المراهقين والإكتئاب من أكثر إهتمامات الصحة العامة شهرة على مستوى العالم تعتبر السمنة السبب الرئيسي للاعتلال والوفاء في العراق في عام 2019. هناك أبحاث واستطلاعات شحيحة بخصوص العلاقة بين مؤشر كتلة الجسم والإكتئاب خاصة لدى الشابات العراقيات.

**هدف الدراسة:** فحص مستوى الإكتئاب لدى الفتيات المراهقات وتحديد العلاقة بين الإكتئاب ومؤشر كتلة الجسم لدى المراهقات في عينة الدراسة. **طرق البحث:** عن طريق استبيان بيك للإكتئاب الذي أجري في بغداد في 11 مدرسة ثانوية تم اختيارها عشوائياً من بغداد / الكرخ وتم طرح الاستبيان ل 350 مراهقة تم اختيارهن بطريقة عشوائية من المدارس للفترة من 1 كانون الثاني 2023 والى نهاية ايار 2023 وبعدها تم قياس طول ووزن كل طالبة باستخدام مقياس خاص للوزن والطول وتم حساب مؤشر كتلة الجسم لكل طالبة وتم تقسيم الطالبات المشمولات وفقاً لوزنهن. تم استخدام اختبار مربع كاي لمعرفة اهمية الارتباط بين المتغيرات واعتبرت قيمة  $P < 0.05$  كنقطة لتميز الاحتمالية.

**النتائج:** 14% من الخاضعات للدراسة كن يعانين من نقص الوزن، 59% وزن طبيعي، 21% وزن زائد و 6% سمنة. من الطالبات اللاتي خضعن للدراسة لم يكن لديهن أعراض اكتئاب 43.1%، 16% لديهن اضطراب مزاجي خفيف، و 24.3% كن على حدود الإكتئاب السريري، و 13.4% كان لديهن اكتئاب متوسط بينما الإكتئاب الشديد وجد في 3.1% من الحالات. 15% من الطالبات اللواتي يعانين من السمنة المفرطة كانت لديهن أعراض إكتئاب حادة وهي أعلى بكثير من معدل أعراض الإكتئاب الحادة بين اللواتي يعانين من زيادة في الوزن (1.4%). وأيضا أكثر من نوات الوزن الطبيعي (2.4%) واللواتي يعانين من نقص الوزن (3.4%).

**الإستنتاج:** هناك ارتباط كبير بين السمنة والإكتئاب الشديد وايضاً ارتباط كبير بين معدل كتلة الجسم والإكتئاب. **الكلمات المفتاحية:** المراهقون، مؤشر كتلة الجسم، السمنة، أعراض الإكتئاب، الفتيات العراقيات