

The Relationship Between Body Mass Index and Depression, Anxiety, Body Image, and Eating Attitudes in Adolescents in Iran

Abstract

Background: The aim of this study was to investigate the relationship between body mass index (BMI) and depression, anxiety, body image, and eating attitudes in 12- to 16-year-old adolescents. **Materials and Methods:** In this descriptive-analytical study on 437 students in Shahrekord, Iran, selected by two-step random sampling (selection of schools and students), participants were divided into normal weight (BMI: 5–85th), overweight (BMI: 85–95th), and obese (BMI >95th) groups and completed the questionnaires and data were analyzed by SPSS version 23. **Results:** BMI had a positive correlation with anxiety, depression, and dysfunctional eating attitudes, and negative correlation with body image in adolescents. Mean scores of depression and anxiety in both overweight and obese groups were significantly higher than those in normal weight adolescents but scores of body image and eating attitudes were not different between overweight and normal weight groups. **Conclusion:** Obesity and overweight may have adverse effects on mental health of adolescents and more attention to psychological aspect of obesity can help us to provide better health services to overweight and obese adolescents.

Keywords: Adolescents, anxiety, body image, depression, obesity

Introduction

Body weight has been classified as normal (body mass index [BMI] of 5th–85th percentile), overweight (BMI of 85th–95th percentile), and obese (BMI over 95th percentile).^[1] The prevalence of obesity and overweight has been increasing in children and adolescents in recent decades, especially in Asian countries.^[2] In Iran, obesity and overweight have increased among Tehranian children, especially the age group of 7–9 years.^[3]

Obesity in children and adolescents has been correlated with mental problems such as decreased self-esteem and depression, which is especially important in adolescents.^[4–6] Anxiety is another consequence of obesity that may lead to impaired appetite and exacerbate obesity.^[7] Based on studies in western countries, pressure of standards of beauty and overemphasis on thinness is higher on girls than on boys,^[8] so that negative body image regarding weight and fitness is more frequent in girls.^[9,10] It has been shown that when one perceives his/her appearance as being less favorable with

reference to ideal or acceptable standards, he/she may experience negative emotions and attitudes toward himself/herself such as low self-esteem, low self-concept, and depression.^[11]

Eating disorders may begin with abnormal eating attitudes and then progress to clinical disorders such as anorexia nervosa and bulimia nervosa.^[12] Abnormal eating attitudes include abnormal perceptions about present and ideal body weight, eating behaviors such as cutting food to small pieces, preoccupation with foods and metabolism, and using unconventional ways to eliminate food such as vomiting.^[13] Factors that affect satisfaction with self-image play an important role in onset and maintenance of eating problems, and obesity is an important factor in this regard.^[14,15] Some studies in Iran showed that increased BMI played an important part in the development of abnormal eating attitudes.^[16,17] As cultural background may have an enormous effect on standards of body weight and fitness in both genders, and lack of studies regarding this topic in our region, we decided to comparatively investigate the correlation between BMI

Noushin Rostampour^{1,2}, Masoumeh Naderi¹, Soleiman Kheiri³, Parvin Safavi⁴

¹Department of Pediatric, Shahrekord University of Medical Sciences, ²Modelling in Health Research Center, Shahrekord University of Medical Sciences, ⁴Department of Psychiatry, Clinical Research Development Unit, Hajar Hospital, Sahrekord University of Medical Sciences, Shahrekord, ³Metabolic Liver Disease Research Center, Isfahan University of Medical Sciences, Isfahan, Iran

Address for correspondence:

Dr. Parvin Safavi,
Clinical Research Development Unit, Hajar Hospital, Sahrekord University of Medical Sciences, Shahrekord, Iran.
E-mail: safavi_p@yahoo.com

Received: 17 October 2020

Revised: 26 September 2021

Accepted: 13 December 2021

Published: 29 June 2022

Access this article online

Website: www.advbiores.net

DOI: 10.4103/abr.abr_259_20

Quick Response Code:



How to cite this article: Rostampour N, Naderi M, Kheiri S, Safavi P. The relationship between body mass index and depression, anxiety, body image, and eating attitudes in adolescents in Iran. *Adv Biomed Res* 2022;11:51.

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: WKHLRPMedknow_reprints@wolterskluwer.com

and depression, anxiety, body image, and eating attitudes in 12- to 16-year-old adolescents in Shahrekord, Iran. The result of this study could help the clinician to early identification of these disorders and consider psychological aspect of obesity in the treatment of obesity.

Materials and Methods

This cross-sectional descriptive-analytical study was approved by Shahrekord University of Medical Sciences with the ethical code of IR.SKUMS.REC.1396.251. It was done on 12- to 16-year-old students in Shahrekord, Iran, in 2018. Inclusion criteria were the age of 12 to 16 years were satisfied to participate in study and exclusion criteria were chronic physical or mental illness, medication for chronic illness or psychiatric disorder, addiction of the participant or in his/her family, separation of parents, and unemployment in the family. Participants were selected by two-step random sampling. First, seven girls' schools and seven boys' schools were selected randomly, and then, the weights and heights of students were measured, their BMI was calculated, and participants were divided into normal weight (BMI: 5–85th), overweight (BMI: 85–95th), and obese (BMI>95th) groups.^[18] Next, 145 students for each weight group and a total of 435 students were randomly selected (about 10 students for each group and 30 students from each school) and were asked to fill out the questionnaires. The study design was explained to participants and then their informed consent to participate in the study was obtained. The research tools used in this study were Body Image Inventory, the eating attitudes test-26 items (EAT-26), and the Depression, Anxiety, and Stress Scale-21 Items (DASS-21).

The Body Image Inventory was developed by Fisher^[19] and consists of 46 items. Each item is scored on a 5-point Likert scale (from 1 = very dissatisfied to 5 = very satisfied). To obtain the total score of body image, the items' scores are summed up. The minimum and maximum attainable scores on the scale are 46 and 230, respectively, and higher scores represent more favorable body image. The Persian version of the inventory has shown high test–retest reliability for students ($r = 0.84$) and its Cronbach's alpha was reported 0.93.^[20] In another study, its Cronbach's alpha coefficient was calculated at 0.94.^[21]

The EAT-26 is a 26-Item self-report measure of disordered eating attitudes and risk of eating disorders. The Persian version of the test has been already validated by Gargari *et al.*^[22] The internal consistency (Cronbach's alpha) and test–retest reliability of the instrument have been reported to be 0.75 and 0.85, respectively. The total score of 20 or higher is considered as being at risk of eating disorders (disordered eating attitudes).^[22]

Each subscale of the DASS-21 is investigated by seven items scored on a 4-point likert scale (0–3). The validity and reliability of the DASS-21 have been confirmed for the

Iranian population. In a study on students and militants, the translated version of the scale was found to have an internal consistency of 0.77, 0.79, and 0.78 for depression, anxiety, and stress, respectively.^[23]

Data analysis

The mean \pm standard deviation was used for descriptive statistics. Normality distribution was assessed with the Kolmogorov test. Since data were nonnormally distributed, Kruskal–Wallis test was used to compare groups and Dunn's test was used for pairwise comparisons. The Spearman coefficient of correlation was used to check the correlation. Statistical significance was defined as $P < 0.05$ and analysis was performed using SPSS software (SPSS Inc., version 23.0, Chicago, IL, USA).

Results

A total of 437 (146 normal weight, 146 overweight, and 145 obese) students completed the research tools. Two hundred and eighteen students were boys and 219 were girls. Table 1 shows the age, weight, height, and BMI of our participants in three groups.

The Spearman's correlation coefficients of mental indexes with each other and with BMI are shown in Table 2. It shows that depression and anxiety scores have significant positive correlation with BMI ($r = 0.28$, $P < 0.001$), ($r = 0.24$, $P < 0.001$), but body image has inverse correlation with BMI ($r = -0.15$, $P = 0.002$) and scores of depression ($r = -0.48$, $P < 0.001$) and anxiety ($r = -0.40$, $P < 0.001$). Table 1 shows the scores of depression, anxiety, body image, and eating attitudes in the three groups. It shows that all variables have significant differences between three groups in general. Paired comparison of the indexes between groups shows that scores of depression and anxiety in normal weight adolescents are significantly different from those in overweight and obese groups. Besides this, scores of body image and eating attitudes in

Table 1: Comparing age, weight, height, body mass index, and the scores of depression, anxiety, body image, and impaired attitudes to eating in three groups of adolescents

Variable	Group, mean \pm SD			P
	Normal	Overweight	Obese	
Age (year)	14 \pm 1.4	13.9 \pm 1.3	13.8 \pm 1.2	0.42
Weight (kg)	49.8 \pm 7.1 ^a	58.7 \pm 9.5 ^b	66.6 \pm 9.6 ^c	<0.001*
Height (cm)	156.6 \pm 8.3	155.5 \pm 8.7	154.7 \pm 8.9	0.13
BMI (kg/cm ²)	20.2 \pm 1.6 ^a	24.0 \pm 1.7 ^b	27.7 \pm 8.2 ^c	<0.001*
Depression	11.4 \pm 6.2 ^a	14.9 \pm 5.0 ^b	14.5 \pm 8.3 ^b	<0.001*
Anxiety	10.8 \pm 3.8 ^a	12.0 \pm 4.1 ^b	13.0 \pm 4.3 ^b	<0.001*
Body image	180.3 \pm 3.5 ^a	182.3 \pm 67.9 ^a	168.4 \pm 1.2 ^b	0.001
Impaired attitudes to eating	12.5 \pm 7.8 ^a	14.6 \pm 10.3 ^a	19.3 \pm 12.4 ^b	<0.001*

*Different superscript show significant different. BMI: Body mass index, SD: Standard deviation

Table 2: Spearman correlation coefficient of variables in adolescents

Variable	BMI	Depression	Anxiety	Body image
Depression	$r=0.28$, $P<0.001$	-	-	-
Anxiety	$r=0.24$, $P<0.001$	$r=0.67$, $P<0.001$	-	-
Body image	$r=-0.15$, $P=0.002$	$r=-0.48$, $P<0.001$	$r=-0.40$, $P<0.001$	-
Impaired attitudes to eating	$r=0.22$, $P<0.001$	$r=0.23$, $P<0.001$	$r=0.28$, $P<0.001$	$r=-0.11$, $P=0.026$

BMI: Body mass index

obese adolescents were significantly different from those in overweight and normal weight groups, but the latter two groups were not different in body image scores.

Discussion

In this study, BMI showed a significant correlation with anxiety, depression, body image, and eating attitudes in adolescents.

Our results showed that scores of depression and anxiety had a direct correlation with BMI, and the scores in overweight and obese groups were significantly higher than those in normal weight group. The results are similar to the findings of other studies on adolescents showing that obesity and overweight were associated with dissatisfaction with body image and there was a significant inverse correlation between BMI and body image, depression, and anxiety and mediated by follow-up attractiveness, or life satisfaction or health state.^[24,25] Milano *et al.* revealed that there is a significant relationship between obesity depression and metabolic alterations and the presence of proinflammatory cytokines.^[26] However, Hech reported that there was no significant correlation between obesity and mental disorders and decreased sense of well-being.^[27] A study showed that girls in terms of obesity had a 43% higher risk of depression and anxiety compared to boys.^[28] A review study on the relation between psychiatric disorders and obesity, including 21 articles from inception till October 2016, reported that maximal evidence existed for the association between depression and obesity. For anxiety disorders, associations were of modest magnitude. Among other disorders, obesity and eating disorders appeared to have a close link.^[27]

The results of the present study showed that anxiety scores were higher in overweight and obese adolescents than in normal weight ones. Wang *et al.* also reported similar results.^[29] They concluded that increased weight is associated with decreased physical preparedness, physical self-esteem, and sense of self efficacy, which may affect anxiety. Obese adolescents also have negative body image compared with normal weight adolescents, which affects their social acceptance and may cause anxiety. However, the study of Hashemipour *et al.* in Isfahan, Iran, did not

show a significant difference in anxiety scores between overweight and obese adolescents and normal weight peers.^[30] This study has been conducted in 2003, and there may have been changes in the criteria of beauty and fitness in adolescents in recent years.

The present study showed decreased scores of body image in obese students compared with normal weight and overweight groups, consistent with the study of Golian *et al.*^[31]

Abnormal eating attitudes had a significant, positive correlation with BMI and depression and anxiety scales. In the study of Hayes *et al.*, abnormal eating attitudes were more frequent in obese adolescents than in normal weight ones,^[32] but in the study of Moya *et al.*, no correlation between abnormal eating attitudes and BMI was found.^[33] Therefore, factors other than BMI may affect eating attitudes, such as high levels of anxiety and depression, low self-esteem, dissatisfaction with body image, and influence of western culture standards of beauty and overemphasis on thinness in mass media.^[34,35]

Conclusion

Obesity and overweight may have adverse effects on the mental health of adolescents. The results of this study suggest that there is a direct correlation between BMI and depression, anxiety, and abnormal eating attitudes and an inverse correlation between BMI and body image. Paying attention to psychological comorbidities resulting from obesity can help nutritionists and endocrinologists to provide better health services to overweight and obese adolescents.

Limitations

The research tools used in this study were self-report. Face-to-face interviews with adolescents may help to gain more reliable information about their psychological problems.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

- Weir CB, Jan A. BMI classification percentile and cut off points. In: StatPearls. Treasure Island (FL): StatPearls Publishing; 2021. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK541070/>. [Last updated on 2021 Jun 29].
- Mazidi M, Banach M, Kengne AP, Lipid and Blood Pressure Meta-analysis Collaboration Group. Prevalence of childhood and adolescent overweight and obesity in Asian countries: A systematic review and meta-analysis. *Arch Med Sci* 2018;14:1185-203.
- Barzin M, Aryannezhad S, Serahati S, Beikyazdi A, Azizi F, Valizadeh M, *et al.* Incidence of obesity and its predictors in

- children and adolescents in 10 years of follow up: Tehran lipid and glucose study (TLGS). *BMC Pediatr* 2018;18:245.
4. Rankin J, Matthews L, Cogley S, Han A, Sanders R, Wiltshire HD, *et al.* Psychological consequences of childhood obesity: Psychiatric comorbidity and prevention. *Adolesc Health Med Ther* 2016;7:125-46.
 5. Kansra AR, Lakkunarajah S, Jay MS. Childhood and adolescent obesity: A review. *Front Pediatr* 2020;8:581461.
 6. Sanyaolu A, Okorie C, Qi X, Locke J, Rehman S. Childhood and adolescent obesity in the United States: A public health concern. *Glob Pediatr Health* 2019;6:1-11.2333794X19891305.
 7. Bourdier L, Fatseas M, Maria AS, Carre A, Berthoz S. The psycho-affective roots of obesity: Results from a French study in the general population. *Nutrients* 2020;12:2962.
 8. Uchôa FN, Uchôa NM, Daniele TM, Lustosa RP, Garrido ND, Deana NF, *et al.* Influence of the mass media and body dissatisfaction on the risk in adolescents of developing eating disorders. *Int J Environ Res Public Health* 2019;16:1508.
 9. Jankauskiene R, Baceviciene M. Body image concerns and body weight overestimation do not promote healthy behaviour: Evidence from adolescents in Lithuania. *Int J Environ Res Public Health* 2019;16:864.
 10. Radwan H, Hasan HA, Ismat H, Hakim H, Khalid H, Al-Fityani L, *et al.* Body mass index perception, body image dissatisfaction and their relations with weight-related behaviors among university students. *Int J Environ Res Public Health* 2019;16:1541.
 11. Nguyen DT, Wright EP, Dedding C, Pham TT, Bunders J. Low self-esteem and its association with anxiety, depression, and suicidal ideation in Vietnamese secondary school students: A cross-sectional study. *Front Psychiatry* 2019;10:698.
 12. Hay P. Current approach to eating disorders: A clinical update. *Intern Med J* 2020;50:24-9.
 13. Gianini L, Liu Y, Wang Y, Attia E, Walsh BT, Steinglass J. Abnormal eating behavior in video-recorded meals in anorexia nervosa. *Eat Behav* 2015;19:28-32.
 14. Weinberger NA, Kersting A, Riedel-Heller SG, Luck-Sikorski C. Body dissatisfaction in individuals with obesity compared to normal-weight individuals: A systematic review and meta-analysis. *Obes Facts* 2016;9:424-41.
 15. Bouzas C, Bibiloni MD, Tur JA. Relationship between body image and body weight control in overweight ≥ 55 -year-old adults: A systematic review. *Int J Environ Res Public Health* 2019;16:1622.
 16. Hosseini SN, Emdadi S, Jalilian F, Karami Matin B, Ataee M, Mirzaei Alavijeh M. Fitness intention and its relationship with eating attitudes: A cross-sectional study of Iranian female medical college students. *Iran J Psychiatry Behav Sci* 2016;10:e4307.
 17. Rouzitalab T, Pourghassem Gargari B, Amirsasan R, Asghari Jafarabadi M, Farsad Naeimi A, Sanoobar M. The relationship of disordered eating attitudes with body composition and anthropometric indices in physical education students. *Iran Red Crescent Med J* 2015;17:e20727.
 18. Chung S. Body mass index and body composition scaling to height in children and adolescent. *Ann Pediatr Endocrinol Metab* 2015;20:125-9.
 19. Fisher S. *Body Experience in Fantasy and Behavior*. 1st ed. USA: Appleton-Century-Crofts; 1970.
 20. Khazai K. Correlation between body image and coping styles with severity of primary dysmenorrhea. *J Fundam Ment Health* 2012;14:55-344.
 21. Yazdani N, Hosseini SV, Amini M, Sobhani Z, Sharif F, Khazraei H. Relationship between body image and psychological well-being in patients with morbid obesity. *Int J Community Based Nurs Midwifery* 2018;6:175-84.
 22. Gargari B, Kooshavar D, Sajadi N, Karami S, Shahrokhi H. Risk of eating disorders among high school females of Tabriz in 2007. *Med J Tabriz Univ Med Sci* 2008;30:21-6.
 23. Sahebi A, Asghari MJ, Salari RS. Validation of Depression Anxiety and Stress Scale (DASS-21) for an Iranian Population; 2005.
 24. Rajan TM, Menon V. Psychiatric disorders and obesity: A review of association studies. *J Postgrad Med* 2017;63:182-90.
 25. Lavallee KL, Zhang XC, Schneider S, Margraf J. Obesity and mental health: A longitudinal, cross-cultural examination in Germany and China. *Front Psychol* 2021;12:712567.
 26. Milano W, Ambrosio P, Carizzone F, De Biasio V, Di Munzio W, Foia MG, *et al.* Depression and obesity: Analysis of common biomarkers. *Diseases* 2020;8:23.
 27. Hach I, Ruhl UE, Klose M, Klotsche J, Kirch W, Jacobi F. Obesity and the risk for mental disorders in a representative German adult sample. *Eur J Public Health* 2007;17:297-305.
 28. Lindberg L, Hagman E, Danielsson P, Marcus C, Persson M. Anxiety and depression in children and adolescents with obesity: A nationwide study in Sweden. *BMC Med* 2020;18:30.
 29. Wang S, Sun Q, Zhai L, Bai Y, Wei W, Jia L. The prevalence of depression and anxiety symptoms among overweight/obese and non-overweight/non-obese children/adolescents in China: A systematic review and meta-analysis. *Int J Environ Res Public Health* 2019;16:340.
 30. Hashemipou M, Kelishadi R, Roohafza H, Pourarian S. Assessment of anxiety in 12-18 years old overweight and obese. *J Inflamm Dis* 2005;9:104-8.
 31. Golian S, Ghiyasvand M, Mirmohamad Ali M, Mehran A. The relationship between body image of obese adolescent girls and depression, anxiety and stress. *Health Monit J Iran Inst Health Sci Res* 2014;13:433-40.
 32. Hayes JF, Fitzsimmons-Craft EE, Karam AM, Jakubiak J, Brown ML, Wilfley DE. Disordered eating attitudes and behaviors in youth with overweight and obesity: Implications for treatment. *Curr Obes Rep* 2018;7:235-46.
 33. Moya T, Fleitlich-Bilyk B, Goodman R. Brief report: Young people at risk for eating disorders in Southeast Brazil. *J Adolesc* 2006;29:313-7.
 34. Blodgett Salafia EH, Jones ME, Haugen EC, Schaefer MK. Perceptions of the causes of eating disorders: A comparison of individuals with and without eating disorders. *J Eat Disord* 2015;3:32.
 35. Izydorczyk B, Truong Thi Khanh H, Lizińczyk S, Sitnik-Warchulska K, Lipowska M, Gulbicka A. Body dissatisfaction, restrictive, and bulimic behaviours among young women: A Polish-Japanese comparison. *Nutrients* 2020;12:666.