

Association of Overweight and Obesity with Mental Distress in Iranian Adolescents: The CASPIAN-III Study

Mohsen Jari, Mostafa Qorbani^{1,2}, Mohammad Esmaeil Motlagh^{3,4}, Ramin Heshmat⁵, Gelayol Ardalan³, Roya Kelishadi

Department of Pediatrics, Child Growth and Development Research Center, Isfahan University of Medical Sciences, Isfahan, Iran, ¹Department of Public Health, Alborz University of Medical Sciences, Karaj, Iran, ²Department of Epidemiology, Endocrinology and Metabolism Research Center, Endocrinology and Metabolism Research Institute, Tehran University of Medical Sciences, Tehran, Iran, ³Department of Adolescents, Youth, and School Health, Bureau of Population, Family, and School Health, Ministry of Health and Medical Education, Tehran, Iran, ⁴Department of Pediatrics, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran, ⁵Department of Epidemiology, Chronic Diseases Research Center, Endocrinology and Metabolism Population Sciences Institute, Tehran University of Medical Sciences, Tehran, Iran

Correspondence to:

Prof. Roya Kelishadi,
Department of Pediatrics,
Child Growth and Development
Research Center, Isfahan University
of Medical Sciences, Isfahan, Iran.
E-mail: kelishadi@med.mui.ac.ir

Date of Submission: Jun 11, 2013

Date of Acceptance: Nov 20, 2013

How to cite this article: Jari M, Qorbani M, Motlagh ME, Heshmat R, Ardalan G, Kelishadi R. Association of overweight and obesity with mental distress in Iranian adolescents: The CASPIAN-III study. *Int J Prev Med* 2014;5:256-61.

ABSTRACT

Background: Excess weight may be associated with mental distress and this relationship varies according to the socio-cultural background of different populations. This study aims to assess the relationship of overweight and obesity with some psychological disorders in a nationally representative sample of Iranian adolescents.

Methods: This nationwide study was conducted in 2009-2010 among 5570 students, aged 10-18 years, living in 27 provinces in Iran. Data were collected by using the translated and validated questionnaire of the World Health Organization Global School-based Health Survey.

Results: Data of 5528 students (49.7% girls) were complete for this study. Their mean age was 14.7 (2.4) years. Overall 7.9% of participants were overweight and 8.8% were obese. 58.7% of students had anxiety, without significant association of overweight (odds ratio [OR]: 0.86, 95% confidence interval [CI]: 0.68-1.09) and obesity (OR: 1.11, 95% CI: 0.88-1.40) with an anxiety. Nearly 62.6% of students reported to have depression, there was no significant relationship between overweight (OR: 1.11, 95% CI: 0.86-1.43) obesity and (OR: 1.01, 95% CI: 0.79-1.29) with the depression. About 49.4% of students had insomnia, without significant association of overweight (OR: 1.17, 95% CI: 0.91-1.51) and obesity (OR: 0.91, 95% CI: 0.71-1.17) with the insomnia.

Conclusions: In Iranian adolescents, excess weight did not increase the risk of psychological distress. This finding might be due to the positive attitude of family and peers to fatness in adolescence.

Keywords: Adolescents, anxiety, depression, Iran, obesity, psychological disorders

INTRODUCTION

The prevalence of obesity in children and adolescents is increasing world-wide, notably in developing countries.^[1-4] Now-a-days, this problem has become one of the important

concerns about general health at the global level.^[5] Excess weight is associated with several adverse physical and mental health effects.^[5-9]

Obesity in childhood and adolescence has different effects on mental health, including symptoms of anxiety, depression, insomnia, social isolation etc., In turn, these conditions would have negative consequences on social relationships and learning issues.^[7,10,11] Some studies documented higher prevalence of mental disorders as depression and anxiety in obese than in normal-weight individuals.^[12,13] In contrast, the prevalence of mental disorders is increasing in children around the world; this can be due to the escalating trend of childhood obesity.^[14,15]

Due to the importance of mental health, it is considered as part of the World Health Organization Global School-based Health Survey (WHO-GSHS).^[16] Similar to most other developing countries, Iran is facing double burden of nutritional disorders.^[17-21] Some studies in Iran have considered the relationship of overweight and obesity with mental disorders.^[16,19,20] Although most studies in Western countries found a higher prevalence of psychiatric disorders in overweight children and adolescents, but studies conducted in two cities in Iran did not document the relationship of body mass index (BMI) with depression and anxiety in Iranian students.^[16,20] Because of diversity in the cultural and socioeconomic background in different regions of Iran, it is necessary to extrapolate such investigations in different parts of the country to help in designing and implementing health promotion programs.

This nationwide study aims to assess the relationship of excess weight with some mental disorders in Iranian students by using the WHO-GSHS questionnaire.

METHODS

This nationwide cross-sectional study was conducted as part of the third national survey of a school-based surveillance system^[21] entitled the Childhood and Adolescence Surveillance and Prevention of Adult Non-communicable disease-III study.

National regulatory organizations and institutional ethical and scientific review boards approved the study. After explanation of the study aims and methods, verbal assent was obtained

from students and written informed consent from their parents.

This study was conducted in 2009-2010 among 5570 students, aged range from 10 to 18 years. They were selected by random cluster sampling from urban and rural areas of 27 provinces in Iran. Detailed methodology is published previously.^[22]

The WHO-GSHS questionnaire was used to assess the psychiatric distress of students. The questions related to the mental distress are presented in Appendix I.

Trained health professionals conducted the physical examination under standard protocols and by using calibrated instruments. BMI was calculated as weight (kg) divided by height squared (m²). BMI categories were defined according to the WHO reference curves.^[23]

Statistical analysis

Continuous variables are expressed as mean (standard deviation [SD]) and categorical variables are presented as number (percentage). Association between BMI categories and mental disorders was assessed using Chi-square test. Logistic regression analysis was used to assess the association of obesity and overweight with mental disorders. Data were analyzed by SPSS software (version 18:0, Chicago, IL). $P < 0.05$ was considered as statistically significant.

Appendix I: List of questions to screen psychiatric distress according to global school-based student health survey questionnaire

Questions	Response
During the past 6 months, how often have you felt anxious?	Almost every day (considered as yes)
During the past 6 months how often have you had a bad sleep?	More than once a week (considered as yes) Almost every week (considered as yes) Almost every month (considered as no) Rarely or never (considered as no)
During the past 12 months, have you had 2 complete weeks of sadness preventing from your routine activities?	A. Yes B. No

RESULTS

Data of 5528 students were complete for this study. Participants consisted of 2726 (49.7%) girls and 2802 (50.3%) boys. Their mean SD age was 14.7 (2.4) years, without significant difference in terms of gender. Overall 17.4% of participants were underweight, 7.9% were overweight and 8.8% were obese.

Table 1 shows the frequency of anxiety according to gender and BMI categories. According to their self-report, 3182 (58.7%) students had anxiety, which consisted of 1417 (53.1%) girls

Table 1: Frequency of self-reported anxiety among Iranian adolescents by gender and weight status: The CASPIAN-III study

Gender	Weight status	Anxiety		Total
		No	Yes	
Boys*	Underweight			
	<i>N</i>	177	298	475
	%	37.3	62.7	100.0
	Normal weight			
	<i>N</i>	608	1110	1718
	%	35.4	64.6	100.0
	Overweight*			
	<i>N</i>	97	159	256
	%	37.9	62.1	100.0
	Obesity**			
<i>N</i>	80	198	278	
%	28.8	71.2	100.0	
Total				
<i>N</i>	962	1765	2727	
%	35.3	64.7	100.0	
Girls*	Underweight			
	<i>N</i>	218	246	464
	%	47.0	53.0	100.0
	Normal weight			
	<i>N</i>	867	962	1829
	%	47.4	52.6	100.0
	Overweight**			
	<i>N</i>	78	100	178
	%	43.8	56.2	100.0
	Obesity**			
<i>N</i>	88	109	197	
%	44.7	55.3	100.0	
Total				
<i>N</i>	1251	1417	2668	
%	46.9	53.1	100.0	

* $P < 0.05$, ** $P > 0.05$. CASPIAN=Childhood and adolescence surveillance and prevention of adult non-communicable disease

and 1765 (64.7%) boys. No significant association was documented neither between overweight and anxiety (odds ratio [OR]: 0.86, 95% confidence interval [CI]: 0.68-1.09), nor between obesity and anxiety (OR: 1.11, 95% CI: 0.88-1.40).

As can be seen in Table 2, 3389 (62.6%) of students reported to have depression, they consisted of 1643 (61.1%) girls and 1746 (64.3%) boys reported to have depression. There was no significant relationship between overweight and depression (OR: 1.11, 95% CI: 0.86-1.43) and between an obesity and depression (OR: 1.01, 95% CI: 0.79-1.29). The self-reported frequency of

Table 2: Frequency of self-reported depression among Iranian students by gender and weight status: The CASPIAN-III study

Gender	Weight status	Depression		Total
		No	Yes	
Boys*	Underweight			
	<i>N</i>	180	300	480
	%	37.5	62.5	100.0
	Normal weight			
	<i>N</i>	604	1114	1718
	%	35.2	64.8	100.0
	Overweight**			
	<i>N</i>	88	162	250
	%	35.2	64.8	100.0
	Obesity**			
<i>N</i>	97	170	267	
%	36.3	63.7	100.0	
Total				
<i>N</i>	969	1746	2715	
%	35.7	64.3	100.0	
Girls*	Underweight			
	<i>N</i>	192	279	471
	%	40.8	59.2	100.0
	Normal weight			
	<i>N</i>	717	1126	1843
	%	38.9	61.1	100.0
	Overweight**			
	<i>N</i>	66	110	176
	%	37.5	62.5	100.0
	Obesity**			
<i>N</i>	73	128	201	
%	36.3	63.7	100.0	
Total				
<i>N</i>	1048	1643	2691	
%	38.9	61.1	100.0	

* $P < 0.05$, ** $P > 0.05$. CASPIAN=Childhood and adolescence surveillance and prevention of adult non-communicable disease

insomnia among students is presented in Table 3. It shows that 2618 (49.4%) of students consisting of 1285 (49.1%) girls and 1333 (49.7%) boys had insomnia. No significant relationship was found neither between overweight and insomnia (OR: 1.17, 95% CI: 0.91-1.51), nor between obesity and insomnia (OR: 0.91, 95% CI: 0.71-1.17).

DISCUSSION

This study, which is the first nationwide study of its kind in Iran, showed that overweight and obesity were not associated with depression,

Table 3: Frequency of self-reported insomnia among Iranian students by gender and weight status: The CASPIAN-III study

Gender	Weight status	Insomnia		Total
		No	Yes	
Boys*	Underweight			
	<i>N</i>	238	224	462
	%	51.5	48.5	100.0
	Normal weight			
	<i>N</i>	862	840	1702
	%	50.6	49.4	100.0
	Overweight**			
	<i>N</i>	104	147	251
	%	41.4	58.6	100.0
	Obesity**			
<i>N</i>	144	122	266	
%	54.1	45.9	100.0	
Total				
<i>N</i>	1348	1333	2681	
%	50.3	49.7	100.0	
Girls*	Underweight			
	<i>N</i>	209	250	459
	%	45.5	54.5	100.0
	Normal weight			
	<i>N</i>	935	859	1794
	%	52.1	47.9	100.0
	Overweight**			
	<i>N</i>	89	79	168
	%	53.0	47.0	100.0
	Obesity**			
<i>N</i>	98	97	195	
%	50.3	49.7	100.0	
Total				
<i>N</i>	1331	1285	2616	
%	50.9	49.1	100.0	

P*<0.05, *P*>0.05. CASPIAN=Childhood and adolescence surveillance and prevention of adult non-communicable disease

anxiety and insomnia in Iranian adolescents. These findings are consistent with two previous studies on small sample size in Iran.^[16,20] Contrary to our findings, several studies in Western countries have documented higher prevalence of these mental disorders in overweight and obese individuals.^[13,24-27] These differences could be because of social and cultural differences, especially the attitude of friends, family members and the community to obesity and obese person in various societies. Similar to previous studies in Iran, our findings propose that overweight and obesity in adolescence are well-accepted by the community and therefore the overweight or obese person is not under pressure by parents and peers.^[16,20] Some previous studies^[27,28] have suggested that obese children, who are mocked by their friends, would experience some negative feelings including shame, isolation and depression. Moreover, these studies proposed that pressure and sneap imposed by parents is increased in overweight and children and adolescents. It is also suggested that depression might lead to unhealthy behaviors and in turn might result in overweight and obesity.^[29]

The current study showed that anxiety and depression are more prevalent in boys than in girls. Some previous studies reported higher prevalence of such disorders in 12-18-year old girls and 10-12-year old boys. They suggested that such differences might be because of hormonal changes during puberty.^[16,28] In another study, depression was reported to be more prevalent in girls with 15-18 years of age and boys aged 10-14 years.^[30] Further studies shall be conducted about the effects of various items including genetic, environmental, cultural, social and nutritional factors on gender differences documented by various studies about the psychiatric distress during adolescence.

The present study did not find any significant difference in the prevalence of insomnia according to gender and weight status. Some studies documented higher prevalence of insomnia in girls and obese individuals.^[24,27] In our study, the prevalence of depression and anxiety was more than a previous study in Iran,^[18] however, our finding is consistent with some other studies.^[25,26,31]

Study limitations and strengths: The main limitations of this study are its cross-sectional setting and using self-reported data on psychiatric distress among adolescents. The main strengths are the

novelty in the region, recruiting a large sample size of adolescents from diverse parts of the country, as well as using an internationally accepted questionnaire.

CONCLUSIONS

We did not find significant relationship between excess weight and psychological distress in Iranian students. This can be because of positive attitude of Iranian families toward fatness in childhood and adolescence.

ACKNOWLEDGMENTS

We forward our sincere thanks to the large team working with this nationwide study. We are also thankful to the participants of this study.

REFERENCES

1. Ogden CL, Carroll MD, Curtin LR, McDowell MA, Tabak CJ, Flegal KM. Prevalence of overweight and obesity in the United States, 1999-2004. *JAMA* 2006;295:1549-55.
2. Kelishadi R. Childhood overweight, obesity, and the metabolic syndrome in developing countries. *Epidemiol Rev* 2007;29:62-76.
3. Kelishadi R, Haghdoost AA, Sadeghirad B, Khajehkazemi R. Trend in the prevalence of obesity and overweight among Iranian children and adolescents: A systematic review and meta-analysis. *Nutrition* 2013; pii:S0899-9007(13)00389-4.
4. Hashemipour M, Kelishadi R, Roohafza H, Poorarian S. Assessment of anxiety in 12-18 years old overweight and obese students. *J Qazvin Univ Med Sci* 2005;9:104-8.
5. Daniels SR, Arnett DK, Eckel RH, Gidding SS, Hayman LL, Kumanyika S, *et al.* Overweight in children and adolescents: Pathophysiology, consequences, prevention, and treatment. *Circulation* 2005;111:1999-2012.
6. National Institute of Mental Health (NIMH). Obesity linked with mood disorders, 2012. Available from: <http://www.nimh.nih.gov/science-news/2012>. [Last accessed on 2013 May 15].
7. Anderson SE, Cohen P, Naumova EN, Must A. Association of depression and anxiety disorders with weight change in a prospective community-based study of children followed up into adulthood. *Arch Pediatr Adolesc Med* 2006;160:285-91.
8. Baumeister H, Härter M. Mental disorders in patients with obesity in comparison with healthy probands. *Int J Obes (Lond)* 2007;31:1155-64.
9. Wellman NS, Friedberg B. Causes and consequences of adult obesity: Health, social and economic impacts in the United States. *Asia Pac J Clin Nutr* 2002;11 Suppl 8:S705-9.
10. Swallen KC, Reither EN, Haas SA, Meier AM. Overweight, obesity, and health-related quality of life among adolescents: The National Longitudinal Study of Adolescent Health. *Pediatrics* 2005;115:340-7.
11. Wyatt SB, Winters KP, Dubbert PM. Overweight and obesity: Prevalence, consequences, and causes of a growing public health problem. *Am J Med Sci* 2006;331:166-74.
12. Janssen I, Craig WM, Boyce WF, Pickett W. Associations between overweight and obesity with bullying behaviors in school-aged children. *Pediatrics* 2004;113:1187-94.
13. Pabst SR, Negriff S, Dorn LD, Susman EJ, Huang B. Depression and anxiety in adolescent females: The impact of sleep preference and body mass index. *J Adolesc Health* 2009;44:554-60.
14. Herva A, Laitinen J, Miettunen J, Veijola J, Karvonen JT, Läsky K, *et al.* Obesity and depression: Results from the longitudinal Northern Finland 1966 Birth Cohort Study. *Int J Obes (Lond)* 2006;30:520-7.
15. Lee ES, Kim YH, Beck SH, Lee S, Oh SW. Depressive mood and abdominal fat distribution in overweight premenopausal women. *Obes Res* 2005;13:320-5.
16. Syed EU, Hussein SA, Haidry SE. Prevalence of emotional and behavioural problems among primary school children in Karachi, Pakistan – Multi informant survey. *Indian J Pediatr* 2009;76:623-7.
17. Tick NT, van der Ende J, Verhulst FC. Twenty-year trends in emotional and behavioral problems in Dutch children in a changing society. *Acta Psychiatr Scand* 2007;116:473-82.
18. Zakeri M, Sedaghat M, Motlagh ME, Tayari Ashtiani R, Ardalan G. BMI correlation with psychiatric problems among 10-18 years Iranian students. *Acta Med Iran* 2012;50:177-84.
19. Ziaodini H, Kelishadi R, Kamsari F, Mirmoghtadaee P, Poursafa P. First nationwide survey of prevalence of weight disorders in Iranian children at school entry. *World J Pediatr* 2010;6:223-7.
20. Kelishadi R, Pour MH, Sarraf-Zadegan N, Sadry GH, Ansari R, Alikhassy H, *et al.* Obesity and associated modifiable environmental factors in Iranian adolescents: Isfahan Healthy Heart Program-Heart Health Promotion from Childhood. *Pediatr Int* 2003;45:435-42.
21. Kelishadi R, Ardalan G, Gheiratmand R, Gouya MM, Razaghi EM, Delavari A, *et al.* Association of physical activity and dietary behaviours in relation to the body mass index in a national sample of Iranian children and adolescents: CASPIAN Study. *Bull World Health Organ* 2007;85:19-26.
22. Kelishadi R, Heshmat R, Motlagh ME, Majdzadeh R,

- Keramatian K, Qorbani M, *et al.* Methodology and early findings of the third survey of CASPIAN Study: A national school-based surveillance of students' high risk behaviors. *Int J Prev Med* 2012;3:394-401.
23. WHO Multicentre Growth Reference Study Group. WHO Child Growth Standards based on length/height, weight and age. *Acta Paediatr Suppl* 2006;450:76-85.
 24. Mulvaney SA, Kaemingk KL, Goodwin JL, Quan SF. Parent-rated behavior problems associated with overweight before and after controlling for sleep disordered breathing. *BMC Pediatr* 2006;6:34.
 25. Pine DS, Goldstein RB, Wolk S, Weissman MM. The association between childhood depression and adulthood body mass index. *Pediatrics* 2001;107:1049-56.
 26. Crisp AH, McGuinness B. Jolly fat: Relation between obesity and psychoneurosis in general population. *Br Med J* 1976;1:7-9.
 27. Storch EA, Milsom VA, Debraganza N, Lewin AB, Geffken GR, Silverstein JH. Peer victimization, psychosocial adjustment, and physical activity in overweight and at-risk-for-overweight youth. *J Pediatr Psychol* 2007;32:80-9.
 28. Sjöberg RL, Nilsson KW, Leppert J. Obesity, shame, and depression in school-aged children: A population-based study. *Pediatrics* 2005;116:e389-92.
 29. Erickson SJ, Robinson TN, Haydel KF, Killen JD. Are overweight children unhappy? Body mass index, depressive symptoms, and overweight concerns in elementary school children. *Arch Pediatr Adolesc Med* 2000;154:931-5.
 30. Deecher D, Andree TH, Sloan D, Schechter LE. From menarche to menopause: Exploring the underlying biology of depression in women experiencing hormonal changes. *Psychoneuroendocrinology* 2008;33:3-17.
 31. Anderson SE, Cohen P, Naumova EN, Jacques PF, Must A. Adolescent obesity and risk for subsequent major depressive disorder and anxiety disorder: Prospective evidence. *Psychosom Med* 2007;69:740-7.

Source of Support: This Study was Conducted as Part of a National School-based Surveillance Program, funded by the Iranian Ministry of Health and Medical Education, **Conflict of Interest:** None declared.

"Quick Response Code" link for full text articles

The journal issue has a unique new feature for reaching to the journal's website without typing a single letter. Each article on its first page has a "Quick Response Code". Using any mobile or other hand-held device with camera and GPRS/other internet source, one can reach to the full text of that particular article on the journal's website. Start a QR-code reading software (see list of free applications from <http://tinyurl.com/yzlh2tc>) and point the camera to the QR-code printed in the journal. It will automatically take you to the HTML full text of that article. One can also use a desktop or laptop with web camera for similar functionality. See <http://tinyurl.com/2bw7fn3> or <http://tinyurl.com/3ysr3me> for the free applications.