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Original Article

The Association of Body Image With Anthropometric Measures and Eating Disorders Among Students From University Sports Teams

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Abstract

Background and aims: Body image is defined as a complex concept involving a person's thoughts, feelings, and attitudes about his/her body. The body image dissatisfaction may expose the individuals, specifically athletes, to eating disorders (EDs). The aim of this study is to assess the association of body image score with EDs and anthropometric measures in students from university sports teams.

Methods: This cross-sectional study was carried out on 225 students from sports teams of Qazvin University in 2014. The samples were selected by the census method. The Multidimensional Body-Self Relations Questionnaire (MBSRQ), eating attitudes test (EAT-26) questionnaire, and demographic information questionnaire were used for collecting data. Anthropometric characteristics were also measured. The data were analyzed in SPSS software version 22.0.

Results: The result of the study showed that the association of body image score with age (P=0.012, OR=0.80, CI=0.179, 1.437) and waist-to-height ratio (WHtR) (*P*=0.013, OR=-52.14, CI=-93.20, -11.08) was positively significant. Although the mean body image score was lower in students with EDs, it was not statistically significant. In addition, there was not a significant association between body image score and other variables such as marital status, gender, educational level, body mass index (BMI), waist circumference (WC), waist-to-hip ratio (WHR), and hip circumference (HC) (*P*>0.05).

Conclusion: In this study, the body image had a positive significant association with age, and a negative significant one with WHtR. This may indicate that abdominal obesity plays an important role in body image satisfaction among students from the university sports teams.

Keywords: Body image, Eating disorders, Sport, Student, Anthropometric measures

Introduction

Body image is defined as a complex concept involving a person's thoughts, feelings, and attitudes about his/her body.[1] Having a positive and real body image is essential to achieve a healthy life.[2] Body image dissatisfaction occurs when there is a difference between actual and desired image.[3] Dissatisfaction with body image is associated with mental disorders such as decrease of self-esteem, depression, social anxiety, eating disorders (EDs), sexual disorders, and other diseases.[4]

Body image dissatisfaction in recent years may be due to the promotion of beauty and thinness by the media.[5] Factors such as body mass index (BMI), body fat percentage, and waist circumference (WC) were identified as the indicators of body image dissatisfaction in some studies.[6-8]

The studies show that body image dissatisfaction may expose the individuals to EDs.[9] EDs are a group of psychiatric problems characterized by dissatisfaction with body image and disturbances in eating behaviors[10] and are considered as one of the most important public health problems, which are associated with a host of morbidities, psychological complications, and considerable reductions in quality of life.[11]

Based on strong evidences, EDs are prevalent in sports, especially in weight-sensitive sports.[12] Therefore, athletes looking for improved performance are more likely to adopt risky behaviors, such as restrictive eating, fasting, frequent skipping meals, diet pills, laxatives, diuretics, enemas, and purging.[13] The prevalence of EDs varies from 6% to 45% in female athletes and from 0% to 19% in male athletes.[14] EDs can have serious effects on an athlete's health and performance.[15] Accordingly, it is necessary to pay more attention to prevention, screening, and treatment of these

disorders.[12]

The body image dissatisfaction and EDs have been evaluated in western countries especially among athletic women.[13,16,17] However, it seems that there is a lack of such studies in developing countries. In Iran, these studies have been mostly conducted on teenagers,[18-20] which confirm the essential need for carrying out more of these studies on other groups especially athletes. In our study, we try to assess the association of body image score with EDs and anthropometric measures in students from university sports teams.

Materials and Methods

Study Population, Design, and Data Collection

This is a cross-sectional study, which was conducted on 225 students from university sports teams from September to February 2014 by the census method. The inclusion criteria in the current study were as follows:

1. Following a certain type of sports (at least for a year)
2. Participating in at least one competitive sport
3. Willingness to participate in the study

The participants were assured that their information would remain confidential and then they gave their informed consent to participate in the study. Those who did not meet the criteria were not included in the study. The sample groups consisted of 121 male athletes (53.8%) and 104 female athletes (46.2%). The types of sports are presented in Table 1.

Table 1. Types of Sports

Type of Sports	No. (%)
Soccer	53 (23.6)
Badminton	30 (13.3)
Volleyball	23 (10.2)
Basketball	17 (7.6)
Futsal	16 (7.1)
Karate	15 (6.7)
Swimming	11 (4.9)
Archery	11 (4.9)
Track and field	10 (4.4)
Hockey	8 (3.6)
Ping Pong	6 (2.7)
Wrestling	5 (2.2)
Other martial arts	5 (2.2)
Chess	2 (0.9)
Gymnastics	2 (0.9)
Boxing	2 (0.9)
Taekwondo	2 (0.9)
Handball	1 (0.4)
Total	219 (97.4)
Missing	6 (2.6)

Measures

Anthropometric Measures

A SECA scale and a tape meter with accuracies of 100 g and 0.1 cm were used by an experienced person for measuring the students' weight and height, respectively.

Then, based on the formula of the division of weight (kg) to the square of height (m), BMI was calculated.[21] WC was measured midway between the lower rib margin and the iliac crest in the horizontal plane, and HP was measured at the point yielding the maximum circumference over the buttocks using a tape meter to measure the nearest 1 cm while the subjects were standing. The waist-to-height ratio (WHtR) was calculated by dividing WC by height and the waist-to-hip ratio (WHR) was calculated by dividing WC by HP.[22]

The Body Image Assessment

The Multidimensional Body-Self Relations Questionnaire (MBSRQ) was used for assessing body image score, which is a self-reported scale including 46 items. Each item is scored on a 5-point scale from 1 (allocated to negative feeling) to 5 (allocated to positive feeling). The reliability of the questionnaire was reported to be 0.89.[23]

Assessment of Eating Disorders

The Eating Attitude Test-26 (EAT-26) questionnaire is widely used to identify those at risk of EDs.[20] This questionnaire includes questions related to diet (13 questions), diet control (7 questions), tendency to food (3 questions) and BN related behaviors (3 questions).[24] The questions of the EAT-26 are rated on a Likert scale, and the answers like "always" receive 3 scores, "more often" receive 2 scores, "very often" receive 1 score. The score of three remaining options ("sometimes", "rarely", and "never") would be zero. Therefore, the scores obtained from the EAT-26 questionnaire range from 0 to 78. Those who scored 20 points or higher were classified as individuals with EDs.[25] The reliability coefficients for this questionnaire in those exposed to EDs and those in the healthy condition were reported to be 0.9 and 0.83, respectively.[26]

Demographic Information

The demographic information questionnaire was used for gathering data such as gender, age, marital status, and the educational level.

Statistical Analysis

In statistical analyses, the association of body image score with qualitative variables (including gender, marital status, educational level and EDs) was assessed via independent *t* test, and Pearson's correlation coefficient was used for assessing the association of body image score with quantitative variables (including age, BMI, WHR, HC, and WHtR). Finally, the linear regression model was used

for the significant variables, based on Tables 2 and 3, in SPSS software version 22.0. The significance level was set at 0.05.

Results

In this study, 225 students were assessed. The mean body image score and mean age of the participants were 152.90±13.46 and 22.13±2.86 (17-37) years, respectively. The majority of students were single (92%) with a bachelor's degree or a lower educational level (76%) (Table 2). The prevalence of EDs among students was 14.2 % (Table 2).

Based on Table 2, although the results showed a negative relationship between body image score and EDs, it was not statistically significant (*P*=0.219). The results of independent *t* test showed that body image score did not have any significant association with gender (*P*=0.865), marital status (*P*=0.756), and educational level (*P*=0.356).

The results of Pearson correlation coefficient (Table 3) showed that body image score had a negative significant association with WHtR (*P*=0.038) and a positive significant association with age (*P*=0.026). However, it did not have any significant association with BMI, WC, WHR, and HC.

The results of general linear model showed that body image score had a positive significant association with age (*P*=0.012) and a negative significant association with WHtR (*P*=0.013) (Table 4).

Table 3. The Association of Body Image Score with Quantitative Variables Among Students from University Sports Teams

Variables	*P* Value*	Correlation Coefficient
Age	0.026	0.152
Body Mass Index (BMI)	0.134	-0.102
Waist circumference (WC)	0.121	-0.106
Waist to hip ratio (WHR)	0.305	-0.071
Hip circumference	0.281	-0.074
Waist to height ratio (WHtR)	0.038	-0.142

* Pearson correlation.

Discussion

The current study was conducted on students from university sports teams. The result of the study showed that body image score had a positive significant association with age and WHtR, but the association between body image score and EDs was not significant.

The prevalence of EDs is higher among athletes than among the general population.[26] Based on the current study, about 14.2% of the students from the university sports teams were exposed to EDs. In the study conducted by Valizadeh and Ariapooran, the prevalence of EDs among athletic women was 16.5%.[28] In another study conducted on female high school athletes, the prevalence of EDs in the total sample was 19.6%.[29] The association between EDs and body image was also assessed in the current study. There is a longitudinal study which has shown that body image dissatisfaction has consistently been recognized as one of the most important risk factors for EDs.[30] In a study by Goltz et al, about 1.4% of athletes suffered from the body image-related EDs.[13] In the current study, the mean body image score in students who were exposed to EDs was lower than those who were not, but this association was not statistically significant, which may be due to the small sample size. This finding is consistent with the results of studies by Safavi et al[18] and Naeimi et al.[31] However, in a study by de Bruin et al, a significant association was observed.[9]

It has been shown that athletes with a higher body fat percentage are more likely to be dissatisfied with their body image.[13] The dissatisfaction with the body weight,

Table 2. The Association of Body Image Score with Qualitative Variables Among Students from University Sports Teams

Variables		Body Image Score	90% CI		*P* Value*
	No. (%)	Mean ± SD	Lower	Upper	
Gender					
Female	104 (46.2%)	152.74±9.80	-3.81	3.32	0.865
Male	121 (53.8%)	153.04±16.0			
Marital status					
Single	207 (92%)	152.81±13.53	-7.80	5.67	0.756
Married	17(7.6%)	153.88±13.40			
Educational level					
Bachelor's degree and lower	171 (76%)	153.38±14.09	-2.22	6.16	0.356
Higher educational level	54 (24%)	151.41±11.30			
EDs					
Yes	32 (14.2%)	148.50±22.87	-3.21	13.55	0.219
No	193 (85.8%)	153.66±10.97			

* *t* test.

Table 4. The Association Between Body Image Score and Variables Among Students from University Sports Teams Based on General Linear Model

Variables*	Standard Error	B	Beta	95% CI		*P* Value
				Lower	Upper	
Age	0.319	0.80	0.172	0.17	1.43	0.012
Waist to height ratio (WHtR)	20.827	-52.14	-0.170	-93.20	-11.08	0.013

* Only significant variables in Tables 2 and 3.

which appears in the form of paying too much attention to the weight, contributes to EDs.[32] The results of the current study showed a negative correlation between body image score and BMI, however, it was not statistically significant. In the study conducted by Sabeti and Gorjian, this correlation was significant in adolescents.[2] These differences are justifiable because our study was conducted on university students who were selected from sports teams and were older in age, so the characteristics of the samples are different in these two studies.

In this study, the association of body image with WHtR was assessed. The importance of WHtR in recent years is related to its ability in diagnosing central adiposity.[33] Some studies have shown the inverse association of WHtR with cardiovascular diseases and diabetes.[34-36] It has also a negative association with body image satisfaction.[37] The results of the current study showed a negative significant association between WHtR and body image score. Unfortunately, there are few studies which have assessed the association of body image and WHtR, specifically among athletes. Therefore, further studies in this area are recommended.

The satisfaction with the body image may vary from one age to another.[38] The results of the current study showed a positive significant association between the body image score and the mean age, which was consistent with a study conducted by Anderson et al.[7] In a study done by Akram and Borland, although older women were larger than younger women, their body image satisfaction was higher.[39] In the study by Alvarez-Rayón et al, being an older woman was associated with great tendency to be thin and bodily dissatisfaction.[38] However, no significant association was found in a study by Aquino et al.[40] In total, there is not consensus among researchers about the association of body image and age, and they argue that dissatisfaction with body image is not limited to a specific age.[41,42]

Limitations

This study has some limitations which are mentioned below:

1. The type of sports was not considered in the analysis of data in the present study, the body image and the prevalence of EDs may be different in various types of sports.
2. In this study, the instrument used was not able to detect clinical EDs. For a diagnosis, students who presented with abnormal values in this questionnaire should refer for clinical evaluation conducted by a specialist.
3. Body composition was not assessed in this study. The assessment of body composition, along with anthropometric measurements, may provide a better picture of these associations.

Conclusion

In this study, the association of body image with demographic characteristics, anthropometric measures, and EDs was assessed among students from the university sports teams. Few studies in Iran have assessed these relationships. The results of this study showed that WHtR, as an anthropometric measure, had a positive significant association with body image score. However, the association of body image with other anthropometric measures and EDs was not significant. This may be related to the small sample size. We suggest that further studies should be done using larger sample sizes along with the assessment of dietary intake and body composition in a variety of sports, which will provide a better assessment of the determinants of body image satisfaction and its association with EDs.

Ethical Approval

This article is adapted from a master's thesis and was approved by the Research Council and Ethical Committee of Qazvin University of Medical Sciences.

Conflict of Interest Disclosures

None.

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References

1. Behdarvandi M, Azarbarzin M, Baraz S. Comparison of Body Image and its Relationship with Body Mass Index (BMI) in High School Students of Ahvaz, Iran. Int J Pediatr. 2017;5(2):4353-60. doi: 10.22038/ijp.2016.7627.
2. Sabeti F, Gorjian Z. The relationship between the satisfaction of body image and self-esteem among obese adolescents in Abadan, Iran. Iran J Diabetes Obes. 2013;5(3):126-31.
3. Melching K, Green M, O'Neal EK, Renfroe L. Body image dissatisfaction: responses between male and female exercisers and non-exercisers. Int J Exerc Sci. 2016;9(3):248-57.

4. Nye S, Cash TF. Outcomes of manualized cognitive-behavioral body image therapy with eating disordered women treated in a private clinical practice. Eat Disord. 2006;14(1):31-40. doi: 10.1080/10640260500403840.
5. Hogan MJ, Strasburger VC. Body image, eating disorders, and the media. Adolesc Med State Art Rev. 2008;19(3):521-46, x-xi.
6. Glaner MF, Pelegrini A, Cordoba CO, Pozzobon ME. Association between body image dissatisfaction and anthropometric indicators in adolescents. Rev Bras Educ Fís Esporte. 2013;27(1):129-36.
7. Anderson LA, Eyler AA, Galuska DA, Brown DR, Brownson RC. Relationship of satisfaction with body size and trying to lose weight in a national survey of overweight and obese women aged 40 and older, United States. Prev Med. 2002;35(4):390-6.
8. Legey S, Lamego MK, Lattari E, Campos C, Paes F, Sancassiani F, et al. Relationship among body image, anthropometric parameters and mental health in physical education students. Clin Pract Epidemiol Ment Health. 2016;12:177-87. doi: 10.2174/1745017901612010177.
9. de Bruin AP, Oudejans RR, Bakker FC, Woertman L. Contextual body image and athletes' disordered eating: the contribution of athletic body image to disordered eating in high performance women athletes. Eur Eat Disord Rev. 2011;19(3):201-15. doi: 10.1002/erv.1112.
10. Abd El-Azeem Taha AA, Abu-Zaid HA, El-Sayed Desouky D. Eating Disorders Among Female Students of Taif University, Saudi Arabia. Arch Iran Med. 2018;21(3):111-7.
11. Sim LA, McAlpine DE, Grothe KB, Himes SM, Cockerill RG, Clark MM. Identification and treatment of eating disorders in the primary care setting. Mayo Clin Proc. 2010;85(8):746-51. doi: 10.4065/mcp.2010.0070.
12. Currie A. Sport and eating disorders - understanding and managing the risks. Asian J Sports Med. 2010;1(2):63-8.
13. Goltz FR, Stenzel LM, Schneider CD. Disordered eating behaviors and body image in male athletes. Braz J Psychiatry. 2013;35(3):237-42. doi: 10.1590/1516-4446-2012-0840.
14. Bratland-Sanda S, Sundgot-Borgen J. Eating disorders in athletes: overview of prevalence, risk factors and recommendations for prevention and treatment. Eur J Sport Sci. 2013;13(5):499-508. doi: 10.1080/17461391.2012.740504.
15. Joy E, Kussman A, Nattiv A. 2016 update on eating disorders in athletes: A comprehensive narrative review with a focus on clinical assessment and management. Br J Sports Med. 2016;50(3):154-62. doi: 10.1136/bjsports-2015-095735.
16. Costarelli V, Stamou D. Emotional intelligence, body image and disordered eating attitudes in combat sport athletes. J Exerc Sci Fit. 2009;7(2):104-11. doi: 10.1016/S1728-869X(09)60013-7.
17. Reinking MF, Alexander LE. Prevalence of disordered-eating behaviors in undergraduate female collegiate athletes and nonathletes. J Athl Train. 2005;40(1):47-51.
18. Safavi M, Mahmoodi M, Roshandel A. Assessment of body image and its relationship with eating disorders among female students of Islamic Azad University, Tehran center branch. Medical Sciences Journal of Islamic Azad University , Tehran Medical Branch. 2009;19(2):129-34. [Persian].
19. Mohamadirizi S, Yousefi F, Boroumandfar Z. The Relationship between Eating Disorder Symptoms and Social Anxiety Disorder in Students in Isfahan. Int J Pediatr. 2014;2(4.2):47-53. doi: 10.22038/ijp.2014.3481.
20. Nobakht M, Dezhkam M. An epidemiological study of eating disorders in Iran. Int J Eat Disord. 2000;28(3):265-71.
21. Nuttall FQ. Body mass index: obesity, BMI, and health: a critical review. Nutr Today. 2015;50(3):117-28. doi: 10.1097/nt.0000000000000092.
22. Lichtenauer M, Wheatley SD, Martyn-St James M, Duncan MJ, Cobayashi F, Berg G, et al. Efficacy of anthropometric measures for identifying cardiovascular disease risk in adolescents: review and meta-analysis. Minerva Pediatr. 2018;70(4):371-82. doi: 10.23736/s0026-4946.18.05175-7.
23. Rahati A. Study of body image and relationship with self-esteem on basis comparison ages groups teenagers,middle-aged, youth and old persons [dissertation]. Tehran: Shahed University; 2004.
24. Khaled SM, Kimmel L, Le Trung K. Assessing the factor structure and measurement invariance of the eating attitude test (EAT-26) across language and BMI in young Arab women. J Eat Disord. 2018;6:14. doi: 10.1186/s40337-018-0199-x.
25. Costa LC, Vasconcelos FA, Peres KG. Influence of biological, social and psychological factors on abnormal eating attitudes among female university students in Brazil. J Health Popul Nutr. 2010;28(2):173-81.
26. Anderson DA, Lundgren JD, Shapiro JR, Paulosky CA. Assessment of eating disorders: review and recommendations for clinical use. Behav Modif. 2004;28(6):763-82. doi: 10.1177/0145445503259851.
27. Martinsen M, Sundgot-Borgen J. Higher prevalence of eating disorders among adolescent elite athletes than controls. Med Sci Sports Exerc. 2013;45(6):1188-97. doi: 10.1249/MSS.0b013e318281a939.
28. Valizadeh A, Ariapooran S. Prevalence of eating disorders and their role in psychological signs among women with sport activities. Journal of Guilan University of Medical Sciences. 2011;20(79):15-23. [Persian].
29. Pernick Y, Nichols JF, Rauh MJ, Kern M, Ji M, Lawson MJ, et al. Disordered eating among a multi-racial/ethnic sample of female high-school athletes. J Adolesc Health. 2006;38(6):689-95. doi: 10.1016/j.jadohealth.2005.07.003.
30. Costarelli V, Stamou D. Emotional intelligence, body image and disordered eating attitudes in combat sport athletes. J Exerc Sci Fit. 2009;7(2):104-11. doi: 10.1016/S1728-869X(09)60013-7.
31. Naeimi AF, Haghighian HK, Gargari BP, Alizadeh M, Rouzitalab T. Eating disorders risk and its relation to self-esteem and body image in Iranian university students of medical sciences. Eat Weight Disord. 2016;21(4):597-605. doi: 10.1007/s40519-016-0283-7.
32. van Niekerk RL, Card M. Eating attitudes: The extent and risks of disordered eating among amateur athletes from various sports in Gauteng, South Africa. S Afr J Psychiatr. 2018;24:1179. doi: 10.4102/sajpsychiatry.v24i0.1179.
33. Yoo EG. Waist-to-height ratio as a screening tool for obesity and cardiometabolic risk. Korean J Pediatr. 2016;59(11):425-31. doi: 10.3345/kjp.2016.59.11.425.
34. Shen S, Lu Y, Qi H, Li F, Shen Z, Wu L, et al. Waist-to-height ratio is an effective indicator for comprehensive cardiovascular health. Sci Rep. 2017;7:43046. doi: 10.1038/srep43046.
35. Choi JR, Koh SB, Choi E. Waist-to-height ratio index for predicting incidences of hypertension: the ARIRANG study. BMC Public Health. 2018;18(1):767. doi: 10.1186/s12889-018-5662-8.
36. Browning LM, Hsieh SD, Ashwell M. A systematic review of waist-to-height ratio as a screening tool for the prediction of cardiovascular disease and diabetes: 0.5 could be a suitable

global boundary value. Nutr Res Rev. 2010;23(2):247-69. doi: 10.1017/s0954422410000144.
37. Pelegrini A, Sacomori C, Santos MC, Sperandio FF, Cardoso FL. Body image perception in women: prevalence and association with anthropometric indicators. Rev Bras Cineantropom Desempenho Hum. 2014;16(1):58-65. doi: 10.5007/1980-0037.2014v16n1p58.
38. Alvarez-Rayón G, Franco-Paredes K, López-Aguilar X, Mancilla-Díaz JM, Vázquez-Arévalo R. [Body image and eating disorders]. Rev Salud Publica (Bogota). 2009;11(4):568-78.
39. Akram S, Borland H. Age is no barrier to wanting to look good: women on body image, age and advertising. Qualitative Market Research: An International Journal. 2007;10(3):310-33.
40. Aquino MT, Orense CL, Tanchoco CC, Amarra SV, Tajan MG, Dela Cruz EO. Correlates of body image satisfaction among economically depressed urban Filipino women. Philipp J Sci. 2009;138(1):67-74.
41. Thomas J, Khan S, Abdulrahman AA. Eating attitudes and body image concerns among female university students in the United Arab Emirates. Appetite. 2010;54(3):595-8. doi: 10.1016/j.appet.2010.02.008.
42. Smolak L, Murnen SK. Drive for leanness: assessment and relationship to gender, gender role and objectification. Body Image. 2008;5(3):251-60. doi: 10.1016/j.bodyim.2008.03.004.

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