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The relationship of general and abdominal obesity with self-esteem in Iranian soldiers of Tehran barracks

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ABSTRACT

Background: Nowadays, social acceptance criteria have changed, which can affect individuals' self-esteem. One of these criteria is physical fitness. On the other hand, overweight and obesity have increased in recent decades. This has a substantial impact on physical and mental health. The present study aims to explore the association of general and abdominal obesity with self-esteem.

Methods: This cross-sectional study was conducted in May 2016 on 246 soldiers who were selected from barracks of Tehran through cluster sampling according to inclusion criteria. Anthropometric measurements were performed according to standards introduced. For each of the participants, 24-hour food recall were recorded and dietary diversity score was determined. Self-esteem was assessed using the Rosenberg Self-esteem Scale. In the final analysis, confounding factors was controlled, and a P value of less than 0.05 was considered statistically significant.

Results: In this study, 37% of people had low self-esteem. In the adjusted model, an inverse association was observed between self-esteem and central obesity (OR = 1.25, 95% CI: 1.05-1.53, P for trend = 0.01). Also, people with generalized obesity had a higher risk for having lower self-esteem (OR = 1.50, 95% CI: 1.31-1.73, P for trend = 0.01).

Conclusion: Overall, general and central obesity have an inverse relationship to self-esteem. This relationship remains even after controlling for potential confounders. Prospective studies are required to confirm these associations in military populations.

Introduction

Obesity results from an imbalanced energy intake and the accumulation of fat in the body [1]. Obesity is a risk factor for many health problems and diseases [2]. The prevalence of obesity is rapidly growing in developed countries, especially the United States, as well as developing countries. Systematic studies in 191 countries indicate that 1.46 billion people are overweight and 504 million people are obese in the world [3]. The World Health Organization reported the prevalence of obesity and overweight to be 54% for women and 31% for men in the Middle Eastern countries [4]. Studies have predicted a high prevalence of overweight and obesity in Iran [5,6]. Studies show that, between 1988 to 2002, the rate of obesity has increased from 4.5% to 10.5% among Iranian men and from 5.1% to 22.5% among Iranian

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women [7,8]. The issue of overweight and obesity in the adolescent and young population, including soldiers, is important because it is directly related to obesity and its complications in adulthood [9,10].

Type of body fat distribution is more important than obesity itself, with central obesity being a more important predictor of chronic disease than general obesity [11,12]. In Iran, 67% of women and 33% of men have central obesity [13,14]. The complications of obesity and overweight are type 2 diabetes, cardiovascular disease, some cancers, neurological disorders and mental illness [15,16].

Psychological disorders contribute significantly to the global burden of disease [17]. One of the psychological problems is the lack of self-esteem, which affects all aspects of life from thought to behavior. The issue of obesity and self-esteem is an important problem in soldiers due to the inherent characteristics of the military environment [18]. Low self-esteem is associated with aggression, antisocial behavior, delinquency, criminal behavior, and economic weakness [19,20]. Self-esteem is confidence in one's own worth or abilities [21].

Studies suggest that obesity results in social isolation and low self-esteem [22,23]. Obese people tend to have lower self-esteem in the workplace [24,25]. In most communities, slimmness has become a criterion for attractiveness and social success [26], to the extent that a healthy, educated person whose physical fitness falls far under the accepted norms of the society may develop low self-esteem [27].

Most studies examining the relationship between self-esteem and general obesity have failed to provide an objective measure for obesity such as total body fat [28]. Also, waist circumference (WC), as a measure of central obesity, is an important factor in predicting physical and psychological chronic diseases, which has not been considered in previous studies [12,29]. On the other hand, race, age, and gender also affect self-esteem and obesity [30-33], and the criteria for social acceptance are different in different cultures and societies [28]. Therefore, we conducted a cross-sectional study on soldiers to determine the association of general and abdominal obesity with self-esteem.

Materials and Methods
Study population
This cross-sectional study was performed in May 2016 on 246 Iranian young soldiers, who were selected through the cluster sampling from the troops of Tehran barracks. Inclusion criteria were having no specific diet or food allergies, physical illness, or drug use. The study was approved by the Ethics Committee of Tehran University of Medical Sciences.

Anthropometric measurements
Body weight was measured using a scale (Seca, Germany) to the nearest 0.1 kg, with minimum clothing and no shoes. Likewise, height was recorded using a portable stadiometer (Seca, Germany) with an accuracy of 0.1 cm in a standing position. Next, body mass index (BMI) was calculated by dividing the body weight (in kilograms) by the height (in meters) squared [34].

Total body fat measurement using skinfolds: Skinfold thickness was measured at three sites (abdomen, suprailiac, and triceps) using a standard caliper according to the guidelines of the American College of Sports Medicine [35]. Then, Jackson and Pollock's equation was used to calculate total body fat [36]: %Body fat = (0.39287 × sum of skinfolds) – (0.00105 × [sum of skinfolds]2) + (0.15772 × age) – 5.18845

Self-esteem: Self-esteem was assessed using the Rosenberg Self-esteem Scale [37]. The questionnaire has been validated ($\alpha = 0.84$) to be used in Iranian papulation [38]. Based on this questionnaire, people earn points between −10 and +10. The participants were divided into two groups of low self-esteem (Score < 4) and high self-esteem (Score ≥ 4).

Other measurments: Socioeconomic status was assessed by a questionnaire and physical activity was measured by the International Physical Activity Questionnaire (IPAQ) [39].

Obesity: General obesity was determined based on BMI, i.e., BMI ≥ 30 as obese and 30 > BMI ≥ 25 were considered overweight [40]. Waist circumference was used to determine central obesity (abdominal obesity) [41].

Statistical analysis: All statistical analyses were performed using SPSS 23 (IBM SPSS statistics, IBM Corporation, Chicago, IL). Subjects were categorizes by percent body fat (< 20%: normal, 20% to 25%: overweight, and > 25%: obese) [42] and central obesity (WC < 94 cm, WC:94–102 cm, and WC > 102 cm). To determine the significant relationship between variables, we used ANOVA and chi-square tests when applicable. Multivariate logistic regression was used to investigate the relationship between body mass index, waist circumference, and total body fat with self-esteem. In addition to the crude model, two other models were used. The first model was adjusted for age, and the other model was adjusted for smoking, total energy intake, physical activity, and socioeconomic status in addition to age.

Results
In this study, 246 soldiers were examined. They were between 21 and 29 years old with a mean age of 24.1 ± 1.5 years. The average BMI was 23.9 ± 3.8,

Table1: Demographic and anthropometric characteristics (n = 246)

Variables	body mass index			p value[1]
	< 25 N = 158	25–30 N = 72	≤ 30 N = 16	
Age, mean ± SD, y	23.9 ± 1.4	24.2 ± 1.3	25.6 ± 1.9	0.001
WC, mean ± SD, cm	83.2 ± 5.9	95.3 ± 7.7	113.1 ± 5.1	0.001
Economic situation, %				0.001
Weak	43.0	33.3	0	
Average	51.3	59.7	56.3	
Good	5.7	6.9	43.8	
Smoking, %				0.02
Non-smoking	89.9	98.6	81.3	
Physical activity level, %				0.001
Low	8.2	56.9	43.8	
Average	47.5	41.7	18.8	
High	44.3	1.4	37.4	
Lack of self-esteem,[2] %	35.4	47.2	56.3	0.09

[1] *ANOVA and chi-square test for quantitative and qualitative variables, respectively.*
[2] *scores < 4 in the Rosenberg Self-esteem Scale*

Table 2: Results of adjusted multiple logistic regression for review odds ratio lack of self-esteem in general obesity and central obesity

Variables	Central obesity waist circumference			p value	Central obesity body mass index			p value
	1 < 94	2 94-102	3 ≥ 102		1 < 25	2 25-30	3 ≥ 30	
Crude model	1.00	1.64 (1.46-1.85)	1.90 (0.67-2.18)	0.01	1.00	1.81 (1.37-2.34)	1.64 (1.25-2.18)	0.01
Model 1	1.00	1.36 (0.20-1.52)	1.42 (1.24-1.65)	0.01	1.00	1.80 (1.54-2.10)	1.58 (1.33-1.91)	0.01
Model 2	1.00	1.25 (1.11-1.46)	1.25 (1.05-1.53)	0.01	1.00	1.57 (1.40-1.82)	1.50 (1.31-1.73)	0.01

Model 1: Adjusted for age
Model 2: Adjusted for age, smoking, total energy intake, physical activity, and socioeconomic status.
Model 2 also included general obesity and total body fat.

and the mean WC was 88.7 ± 10.6 cm. Based on the self-esteem scores, 37% of the subjects had low self-esteem, 47% moderate self-esteem, and 16% high self-esteem. Age was significantly correlated with BMI (Table 1). With increasing BMI, the percentage of people who had low self-esteem also increased. Only 35.4% of normal individuals had low self-esteem, while 47.2% of the subjects in the overweight and 56.3% in the obese category had low self-esteem.

The odds ratio of risk in low–self-esteem individuals increased with increasing body fat. People with higher body fat had more chances to have low self-esteem. By controlling for confounding factors such as age, smoking, total energy intake, physical activity, and socioeconomic status, it was observed that people with higher WC were more likely to have low self-esteem (OR = 1.25, 95% CI: 1.05-1.53, P for trend = 0.01) (Table 2). According to tertile of central obesity, obese individuals had a greater chance of developing a lack of self-esteem (P for trend = 0.03).

After adjustment for confounding factors, the odds ratio for developing low self-esteem was greater for individuals with higher BMI compared with other people (OR = 1.50, 95% CI: 1.31-1.73, P for trend = 0.01).

Discussion

This study was conducted on young Iranian soldiers to investigate the relationship between general and central obesity with self-esteem. The results of this study suggest an inverse association between central obesity and self-esteem (OR = 1.25, 95% CI: 1.05-1.53, P for trend = 0.01). The study also showed a significant inverse relationship between BMI and self-esteem (OR = 1.50, 95% CI: 1.31-1.73, P for trend = 0.01). This inverse relationship also applies to total body fat.

It has been shown that individuals with higher BMI are more anxious and depressed, have low self-esteem, and lower life satisfaction [43-45]. Weight loss has been recommended for increasing self-esteem, and people who have lost weight have been reported to enjoy increased their self-esteem [44,46]. These findings are consistent with the results of the present study. However, previous studies have not taken into acount waist circumference, which is a more important predictor for physical and mental illness.

Another cross-sectional study investigating 2101 teenagers reported that obese, but not overweight teenagers, were more depressed and had lower self-esteem than normal people [47]. This is inconsistent with the findings of the present study. This

inconsistency, however, may be attributable to study participants' age (teenagers vs young adults). In addition, the study had used BMI as the criterion for determining obesity, while BMI may not be a true reflection of obesity. In the present study, this problem was solved by controling for total body fat.

The ideals of community are determined by the media. It affects mental health, self-esteem, and social acceptance [48]. The mass media exert tremendous influence on nutrition, activity, and self-esteem of the population [49]. In most societies, slimmness is a criterion for attractiveness and social success [26], and achievements in occupational and cultural activities have been highly correlated with body acceptance [50]. So we conclude that physical fitness has an important role in social acceptance and success, which, in turn, leads to increased self-esteem. In contrast, in obese individuals, low body acceptance affects their happiness [45] and quality of life [22]. As a result, their self-esteem is reduced. Studies argue that even healthy educated people with fitness levels far from the ideal of society, have lower self-esteem than other people [27].

One strength of the present study is adoption of a nutritional and psychological approach to the subject and not a one-dimensional look at the problem. Controlling for confounders such as age, smoking, total energy intake, physical activity, and economic situation is another strength of this study.

The major limitation is the cross-sectional design of the study, which does not allow causal inference. Prospective studies will help to understand these mechanisms. Prospective studies are required to confirm these associations in military populations.

Finally, results from this study suggest that, with increased central obesity (waist circumference) and total body fat, individuals' self-esteem will decrease. BMI is significantly associated with lower self-esteem.

Acknowledgment

Conflict of Interest
None of the authors have conflict of interest.

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