

Is the Relation between Waist Circumference and Anxiety Scores Gender Specific?

Bel Çevresi ve Anksiyete Skoru Arasındaki İlişki Cinsiyete Özgü müdür?

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ABSTRACT

Objective: Increased body weight and especially high visceral fat amount is a public health problem associated with morbidity and mortality. The incidence of stress and related diseases are increasing as well and modulated by body weight. On this background, we aimed to investigate the correlation of visceral fat and anxiety in men and women between 18-49 years of age.

Material Methods: The volunteers of 200 women, 152 men were participated in this study. The age, height, weight and waist circumference of the participants were recorded and anxiety scores were calculated out of the "Patient Health Questionnaire-9" applied.

Results: The comparison based on gender and cutoff points for waist circumference, 102 cm in men and 88 cm in women, revealed the higher waist circumference is associated with higher anxiety scores in women than the corresponding men ($p=0.028$).

Conclusion: The results obtained in this study, pointing out the difference between women and men aged 18-49 may help to explain the higher incidence of some gender dependent diseases. The higher stress levels measured especially in wider waist circumference group also supports the role of visceral body fat in this difference. Furthermore, the most frequently used parameter, BMI, is not a good indicator of stress and body weight interaction.

Key words: Anxiety, Waist circumference, Body weight, Gender

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ÖZET

Amaç: Artan vücut ağırlığı ve özellikle yüksek viseral yağ miktarı, morbidite ve mortalite ile ilişkili bir halk sağlığı sorunudur. Stres ve ilişkili hastalıkların insidansı artmakta ve vücut ağırlığı ile modüle edilmektedir. Bu bilgilerle biz çalışmamızda 18-49 yaşları arasındaki kadın ve erkeklerde visseral yağ ve anksiyete ilişkisini araştırmayı amaçladık.

Yöntem: Çalışmaya 152 erkek ve 200 kadın gönüllü dahil edildi. Çalışmaya dahil edilen tüm bireylerin yaş, boy, kilo ve bel çevresi kaydedildi ve uygulanan "Hasta Sağlık Anketi-9" ile anksiyete puanları hesaplandı.

Bulgular: Cinsiyet ve bel çevresine (Limit kadınlarda 88 cm ve erkeklerde 102 cm belirlenmiştir.) göre yapılan karşılaştırmada bel çevresi yüksek olan kadınların, buna karşılık gelen gruptaki erkeklerle göre daha yüksek anksiyete skoruna sahip olduğu tespit edilmiştir ($p=0.028$).

Sonuç: Bu çalışmada elde edilen sonuçlar, 18-49 yaş arası kadınlar ve erkekler arasındaki farklılığa işaret ederek, cinsiyete bağlı bazı hastalıkların daha yüksek görülmesini açıklamaya yardımcı olabilir. Özellikle geniş bel çevresi grubunda ölçülen daha yüksek stres seviyeleri, bu farktaki visseral vücut yağının rolünü de destekler. Ayrıca, en sık kullanılan parametre olan BMI, stres ve vücut ağırlığı etkileşiminin iyi bir göstergesi değildir.

Anahtar sözcükler: Anksiyete, Bel çevresi, Vücut ağırlığı, Cinsiyet

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INTRODUCTION

Obesity is a worldwide public health problem. So that obesity rates have increased globally from 3% to 11% among men and 6% to 15% among women over the past 40 years (1). Since the 1980s the prevalence of obesity has tripled in many countries in European Region as declared by the World Health Organization (WHO), and continues to rise at an alarming rate (2). The increased body weight; overweight or obese status, accompanies various morbidities and leads to increased incidence of mortality. Although WHO classifies body weight according to the body mass index (BMI), it is widely accepted that BMI-based classification may be misleading and other parameters should be preferred to assess obesity. Obesity is defined as excess amount of total body fat focusing on the fat vs fat free body mass (FFM) however, even this definition is not very specific and distribution of fat, closely related with associated health hazards, is not mentioned. Abdominal obesity, assessed by simply measuring the waist circumference, in particular expresses excess visceral fat which has been suggested to be particularly harmful (3, 4). The significant association between abdominal obesity and depression and/or anxiety related conditions is frequent, presenting increase in incidence and prevalence all over the world. A considerable number of clinical trials indicate that obese individuals are almost 25 percent more likely to experience these conditions compared with normal weighted people (5-8). The collected evidences suggest that this is a two-way interaction so that depressed and/or stressed people are more prone to obesity probably due to increased food intake in to help to restore lower serotonin levels back to normal (6). This is a positive feedback worsening both conditions (9).

Obesity and anxiety and/or stress related disorders are considered among major public health issues associated with long-term disability, enormous economic costs, morbidity and mortality (5, 10, 11). Where the fat accumulates is important for the association of obesity with depression and anxiety. In this regard visceral (abdominal) fat is highly predictive and easy to measure (4, 7). Although this relation was previous shown by other studies, we aimed to assess the association between the visceral fat and anxiety and investigate the effect of age and gender by using very easily accessible methods.

MATERIALS and METHODS

The study protocol was performed by the Local Ethics Board of Hacettepe University (Approval number: 2015-808) and a general announcement was made for volunteers between the ages of 18-49 who does not have a chronic disease. Following a short interview with the volunteers 200 women and 152 men meeting the inclusion criteria agreed to participate and gave their consent.

The demographic data was obtained and measurements of height, weight and waist circumference were completed, followed by the application of the Patient Health Questionnaire (12) to score the anxiety level. The weight and height measurement of the participants was performed with light clotting and without shoes with a clinical type weight and height measurement device. The waist circumference was measured by a tape meter at the standing and relaxed position, not holding his/her breath. The meter was placed above hip bones 1 cm below umbilicus horizontally snugging around the waist, but not compressing the skin.

The anxiety scale contained nine items regarding the general feeling of the person and reflects levels of anxiety. The scale was evaluated and scored as suggested (REF) so that the score is in the range of 0 to 27 and the higher the score, the greater the level of anxiety. World Health Organization has determined the cutoff points of waist circumference for diagnosis of abdominal obesity, as ≥ 94 cm for men and ≥ 80 cm for women at action level 1 and ≥ 102 cm for men, ≥ 88 cm for women at action level 2 specifically for white Caucasians (13). Based on this classification the participants were evaluated for gender and for action level 2 as its association with morbidity and mortality is significantly higher. The women were sub grouped as waist circumference < 88 cm (n=164) and ≥ 88 cm (n=36), similarly the men were divided as waist circumference < 102 cm (n=124) and ≥ 102 cm (n=28).

The sample size was calculated by using G-power program and the minimum number required for statistical evaluation was determined as 325. All results were analyzed with SPSS 22.0 statistical package program. The distribution of the data was tested with Kolmogorov-Smirnov test and normally distributed parameters were analyzed by one-way ANOVA and the data that doesn't distribute normally were evaluated by Kruskal Wallis test. $p < 0.05$ was considered as statistically significant.

RESULTS

A total of 200 female and 152 male volunteers aged 18-49 years were included in the study. The mean age of the women and men participated in the study was similar as 26.5 ± 9.5 and 28.8 ± 10.2 , respectively. When the women and men were compared regardless of the waist circumference, they were comparable for all of the parameters. When the participants were grouped on the basis of visceral fat i.e. waist circumference; 164 of the women was classified as normal and 36 of them as high. The same classification for men revealed 124 men in the normal waist circumference group and 28 in high risk group (Table 1).

When data was evaluated separately on gender basis, both in women and men the higher waist circumference was significantly associated with older age. Although there was no statistical significance BMI of men was higher than women (Table 1).

Table 1. Age, Waist Circumference, Body Mass Index and Questionnaire scores of the volunteers participating in the study.

	Women		Men	
	< 88	≥ 88 cm	< 102 cm	≥ 102 cm
n	164	36	124	28
Age	24.4 (17-49)	36.0 (18-49)*	27.4 (18-49)	35.3 (19-48)*
Waist Circumference (cm)	71.9 (50-86)	97.4 (88-114)*	85.1 (60-101)**	112.0 (102-145)*, **
Body Mass Index(kg/m ²)	20,1 (15,8-30,8)	23,3 (17,7-31,9)	26,8 (19,7-36,6)	29,4 (22,9-40,6)
Questionnaire Score	9.6 (0-27)	13.5 (0-22)*	8.9 (0-24)	10.2 (1-19)*, **

* $p < 0.05$ vs corresponding low waist circumference

** $p < 0.05$ vs corresponding women

The questionnaire scores indicating the stress level of the participants were significantly different in women when compared on the basis of visceral fat amount. Moreover, among the comparable visceral adiposity the score of men was significantly lower compared to women in excess visceral fat group ($p = 0.028$) (Figure 1).

The waist circumference of women and men correlated with the stress level, indicating increasing visceral fat amount and increased stress level is related. The relation was stronger in women ($r=0.562$) and significantly different than men ($r=0.327$, $p<0.05$).

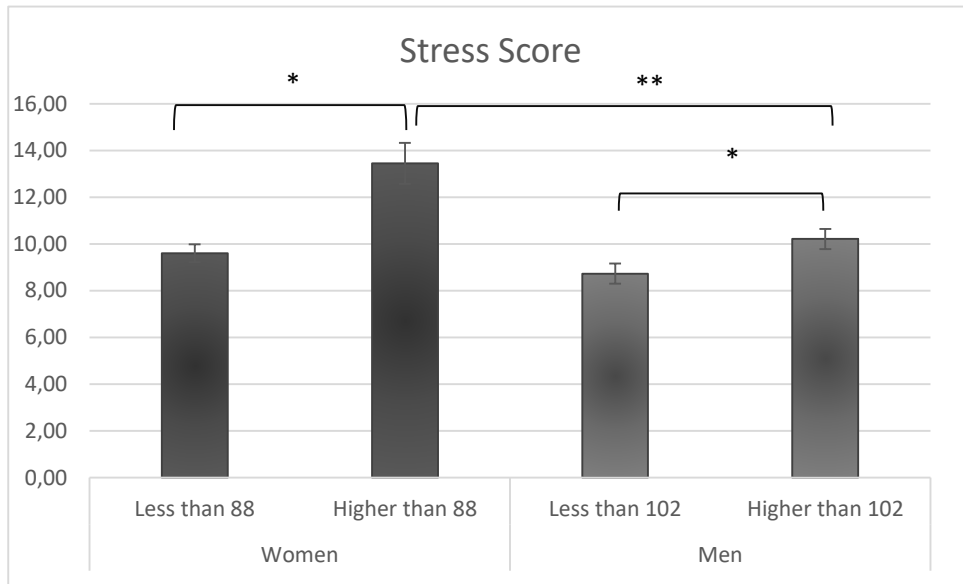


Figure 1. Questionnaire scores of the volunteers participating in the study.

* $p<0.05$ vs corresponding low waist circumference

** $p<0.05$ vs corresponding women

DISCUSSION

The results of this study investigating the effect of gender on the anxiety scores and waist circumference as the representative of visceral fat amount indicated difference between men and women. In addition, we intentionally chose the age group of interest younger than the previous studies as 18-49 years of age since premenopausal and postmenopausal periods are completely different for women such that the accumulated data strongly suggest that the menopausal status may modulate the interaction between obesity and stress (14).

The assessment of obesity is mainly carried out via BMI calculation as it is easy to apply to large groups handy for screening, does not require any measurement but just the statements of the individual. However it is not very specific. On the other hand a very simple, noninvasive measurement of waist circumference is more informative regarding obesity and associated conditions (15). Our results also supported the accumulated data, indicated the change in WC among groups and its relation with stress levels (1,3). The National Health and Nutrition Examination Survey revealed that increasing age is associated with increased waist circumference at both sexes (16). Similarly, we also observed that older men and women have larger waist circumference.

The interaction has been studied at various age groups. A cross-sectional, retrospective chart review article by Fox et. al. including 102 adolescent patients aimed to describe the effect of depression and anxiety on the severity of obesity among youth who requires weight management showed that the incidence of severe obesity is 3.5 times more in depressed adolescents and nearly 5 times higher for those with anxiety (17). Rajan et. al. studied 21 appropriate articles to review the evidence regarding association between mood disorders and obesity and showed that there the strongest relation is with depression where stress is a risk factor. A cross-sectional study including 1296 adolescents performed by Soares et. al. aimed to examine the association among social anxiety, depressive symptoms and waist circumference during adolescence and investigate whether depression mediated the relationship between social anxiety and waist circumference. They found that symptoms of social anxiety were directly associated with symptoms of depression and waist circumference (18). On the other hand another study conducted with 43 years and older age group related obesity in men more with stress (19).

The age group of interest in this study also revealed higher stress level with increasing visceral fat amount the previous reports the impact of age on WC and stress relation. That's why it is important to adjust the results for age, if different age groups are included in the study (20). Longitudinal studies demonstrated a bidirectional link between stress and obesity which is more prominent in women (21). The results of our study indicate that excess visceral fat amount in women at the reproductive age is associated with higher anxiety scores compared to men at the same age range, in line with the previous studies (20).

Although we determined our sample size by power analysis, our study included a relatively small number of participants according to the survey studies. In conclusion, the two-way relation between visceral fat accumulation and stress/anxiety level was valid in reproductive age women as it was previously shown both in post-menopausal period and adolescents. A similar but weaker relation is true for men, as well. As both overfat and increased stress levels are important for general health of individual, further studies in this topic should assess obesity not only via BMI but also with measurements regarding fat distribution and its amount and correct the results for age.

Conflict of interest

No conflict of interest was declared by the authors.

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