

## RESEARCH ARTICLE

# Association Between Increased Waist Circumference and Depression and Anxiety Trend

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**Introduction:** Abdominal adiposity assessed by increased waist circumference and depression have both a high incidence and prevalence and are associated with increased general mortality and cardiovascular risk. Several studies showed a significant association between abdominal obesity, metabolic syndrome and depression. Early detection of these associations is important for prevention and treatment of this disease.

**Material and method:** Eighty patients were enrolled in a cross-sectional descriptive study. Waist circumference was measured in all patients and an increased waist circumference was considered for subjects with values higher than 80 cm in women and higher than 94 cm in men. Patients completed standardized questionnaires HADS for assessment of depression and anxiety. A depression (D) score higher than 10 points showed a trend to depression while an anxiety (A) score higher than 10 indicated a tendency to anxiety. The association between increased waist circumference, depression and anxiety was studied.

**Results:** We interviewed 80 patients, 34 (43%) men (mean age 62+/-6.43) and 46 (57%) women (mean age 59+/-5.16). Increased waist circumference was recorded in 22 men, and in 30 women. We noticed a good association between increased waist circumference and both depression ( $p=0.0006$ ,  $RR=2.007$ ,  $95\%CI$  1.24-3.24) and anxiety ( $p=0.017$ ,  $RR=2.046$ ,  $95\%CI$  1.21-3.45). We found both anxiety and depression risks rather equal in men, while in women we observed a higher depression risk.

**Conclusions:** Increased waist circumference is associated to depression and anxiety tendency in both genders. Depression trend is more powerful in women, while in men both depression and anxiety seen to have an equal frequency. Psychotherapy should be added to lifestyle changes in patients with abdominal adiposity.

**Keywords:** waist circumference, abdominal adiposity, depression, anxiety, HADS questionnaire

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## Introduction

Abdominal adiposity, usually assessed by simply measuring the waist circumference and depression and anxiety, is an extremely frequent condition, presenting an increasingly incidence and prevalence all over the world. Both have high incidence and prevalence and are associated with increased general mortality and cardiovascular risk. Several studies show a significant association between abdominal obesity, metabolic syndrome and depression. There are clinical trials showing that obese people are about 25 percent more likely to experience depression and/or anxiety compared with normal weight people. There are also evidences suggesting that depressed people have a tendency toward obesity. This trend is probably triggered by the tendency to eat in order to restore low serotonin levels back to normal [1]. It is also proven that both obesity and depression are major public health issues, and they can associate a large number of complications and co-morbidities which result in an increased cardiovascular risk [1, 2, 3]. Both obesity and depression have an important impact on personal and professional life of each individual [2, 3]. The obesity type which

is associated to depression and anxiety is also important, as visceral (abdominal) fat is more likely to be highly predictive for developing depression and anxiety symptoms than other types of adiposity [4].

The main goal of our screening was to assess the association between abdominal adiposity and the tendency to depression and anxiety. Another purpose was to demonstrate this association by using easy accessible tools, such as measurement of waist circumference to assess the abdominal adiposity and HADS questionnaire to detect the symptoms associated with depression and anxiety.

HADS questionnaire was used as it was proven to be a simple and accessible yet reliable tool designed to early detect the depression and anxiety symptoms in both psychiatric patients and the general population [5]. Early detection and better understanding of the association between abdominal adiposity and depression and anxiety is important in order to elaborate an effective and concurrent strategy for prevention and treatment.

## Method

A cross-sectional descriptive study on a number of 80 consecutive non- oncological patients admitted in a tertiary cardiovascular rehabilitation hospital was performed. Pa-

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tients with any oncological disease or any end-stage disease were excluded from the study. Waist circumference was measured in centimetres (cm) using a meter tape. According to 2013 ESC prevention guidelines, waist circumference with values higher than 94 cm in men and higher than 80 cm in women was considered an increased waist circumference. After signing the informed consent, all the patients have completed standardized 14 items questionnaires HADS (Hospital Anxiety Depression Scale) in order to assess depression and anxiety tendencies. For each questionnaire depression (D) and anxiety (A) scores were calculated. We considered as a positive trend to depression a D score higher than 10 points and a positive trend to anxiety an A score higher than 10 points. The association between increased waist circumference and high D and A scores was tested using chi square test (Fisher's exact test), with a confidence interval (CI) of 95%, calculating the relative risk (RR) for each association. The association between increased waist circumference and the depression and anxiety trend was tested both overall and differentiated by gender.

## Results

In the 80 screened patients 34 (42.50%) were men, mean age 62+/-6.43 and 46 (57.50%) were women, mean age 59+/-5.16. Increased waist circumference was found in 52 out of 80 patients (65%). According to gender, 22 from 34 men (64.70%) and 30 out of 46 women (65.20%) had increased waist circumference. A significant overall association between an increased waist circumference and the tendency to both depression ( $p=0.0006$ , RR 2.01, 95% CI 1.24 – 3.24) and anxiety symptoms ( $p=0.017$ , RR 2.04, 95% CI 1.21 – 3.45) was observed (table I and II).

**Table I. Overall association between abdominal adiposity and depression trend**

| Waist circumference | D score > 10 | D score ≤ 10 | Total |
|---------------------|--------------|--------------|-------|
| Increased           | 41           | 11           | 52    |
| Normal              | 11           | 17           | 28    |
| Total               | 52           | 28           | 80    |

$p=0.0006$ , RR 2.01, 95% CI 1.24 – 3.24

**Table II. Overall association between increased waist circumference and anxiety trend**

| Waist circumference | A score > 10 | A score ≤ 10 | Total |
|---------------------|--------------|--------------|-------|
| Increased           | 38           | 14           | 52    |
| Normal              | 10           | 18           | 28    |
| Total               | 52           | 28           | 80    |

$p=0.017$ , RR 2.04, 95% CI 1.21 – 3.45

We found the association between increased waist circumference and both depression and anxiety symptoms rather equal in men, as presented in tables III ( $p=0.0356$ , RR 2.18, 95% CI 0.94 – 5.05) and IV ( $p=0.0256$ , RR 1.96, 95% CI 0.97 – 3.90).

**Table III. Association between increased waist circumference and depression trend in men**

| Waist circumference | D score > 10 | D score ≤ 10 | Total |
|---------------------|--------------|--------------|-------|
| > 94 cm             | 16           | 6            | 22    |
| ≤ 94 cm             | 4            | 8            | 12    |
| Total               | 20           | 14           | 34    |

$p=0.0356$ , RR 2.18, 95% CI 0.94 – 5.05

**Table IV. Association between increased waist circumference and anxiety trend in men**

| Waist circumference | A score > 10 | A score ≤ 10 | Total |
|---------------------|--------------|--------------|-------|
| > 94 cm             | 18           | 4            | 22    |
| ≤ 94 cm             | 5            | 7            | 12    |
| Total               | 23           | 11           | 34    |

$p=0.0256$ , RR 1.96, 95% CI 0.97 – 3.90

Our findings showed that the association between increased waist circumference and depression risk ( $p=0.0084$ , RR 1.90, 95% CI 1.06 – 3.39) is stronger than the association between abdominal obesity and anxiety tendency in women ( $p=0.017$ , RR 2.04, 95% CI 1.21 – 3.45), as illustrated in tables V and VI.

**Table V. Association between abdominal adiposity and depression trend in women**

| Waist circumference | D score > 10 | D score ≤ 10 | Total |
|---------------------|--------------|--------------|-------|
| > 80 cm             | 25           | 5            | 30    |
| ≤ 80 cm             | 7            | 9            | 16    |
| Total               | 32           | 14           | 46    |

$p=0.0084$ , RR 1.90, 95% CI 1.06 – 3.39

**Table VI. Association between abdominal adiposity and anxiety tendency in women**

| Waist circumference | A score > 10 | A score ≤ 10 | Total |
|---------------------|--------------|--------------|-------|
| > 80 cm             | 20           | 10           | 30    |
| ≤ 80 cm             | 5            | 11           | 12    |
| Total               | 25           | 21           | 34    |

$p=0.017$ , RR 2.04, 95% CI 1.21 – 3.45

## Discussions

In 80 screened patients admitted in the hospital within a week we found 52 patients (65%) with increased waist circumference. This high percentage fits in the general prevalence of abdominal obesity in individuals between 55 and 65 years of age, which ranges approximately between 42% and 62%, for both gender, in United States and Europe for the last decade [6, 7, 8]. Evidences point to higher rates of prevalence for obesity and abdominal obesity, up to 67%, in Eastern European countries as in Romania [9, 10, 11]. Divided by gender, the prevalence of increased waist circumference is higher in men (averaged 65%+/-6.43) than

in women (averaged 61%+/-5.16), although there is a small increasing trend in women to equal men in abdominal adiposity [8, 9, 11].

In our screened sample, 22 from 34 men had an increased waist circumference (64.7%), value close to Eastern European prevalence of abdominal obesity [9]. In 22 men with abdominal adiposity 16 obtained a D score higher than 10 points, and 18 obtained an A score higher than 10 points. According to the table III, the association between increased waist circumference and depression trend in male patients is rather statistically significant ( $p=0.0356$ , RR 2.18, 95% CI 0.94 – 5.05). Similarly, data presented in table IV show a rather significant association between increased waist circumference and anxiety tendency in men ( $p=0.0256$ , RR 1.96, 95% CI 0.97 – 3.90). We also observed that the abdominal adiposity is rather equally associated to both depression and anxiety in men. Several studies found positive associations between increased waist circumference and depressive and/or anxious symptoms. The association between abdominal adiposity and depression is significant in middle age and older patients and it seems to be related to leptin circulating levels and its peripheral resistance related to visceral fat, especially in male patients [12]. The association between increased waist circumference and depression is focused on somatic-affective clinical manifestations of depressive mood disorder especially in male patients [13]. It is also known and demonstrated by several studies that the link between the increased waist circumference and abdominal obesity seem to be bidirectional [13, 14]. Our findings come to confirm other research demonstrating that the visceral abdominal fat is associated with both depression and anxiety especially in men [14, 15, 16]. There are also studies which demonstrated not only that visceral fat is associated to depressive and anxiety symptoms but proved the individual lean body mass is strongly protective from mood disorders [4, 14, 16].

Concerning female patients, we found 30 from 46 women with increased waist circumference in our screened sample (65.2%). Table V presents a very significant association between abdominal adiposity and depression trend in women ( $p=0.0084$ , RR 1.90, 95% CI 1.06 – 3.39). Data listed in table VI show also a good association between increased waist circumference and anxiety symptoms ( $p=0.017$ , RR 2.04, 95% CI 1.21 – 3.45).

Our observations confirmed the fact that abdominal adiposity and depression are usually strongly associated in female patients and this relationship is stated by a large number of studies [1, 4, 9, 12, 16]. The association between increased waist circumference and anxiety trend in women is rather controversial [13, 14, 16]. Several studies came to prove that anxiety symptoms are associated to variations in body weight and changes in body mass index rather than to abdominal adiposity and increased waist circumference [16, 17]. Other studies observed the positive association between abdominal adiposity and both anxiety

and depressive tendencies especially in post-menopausal women [6, 13, 14]. In our 80 studied patients, 46 were post-menopausal women, mean age 59+/-5.16, and in our studied sample we found the increased waist circumference was significantly associated to anxiety symptoms.

Further studies on larger number of patients are required to confirm the association between abdominal adiposity and depression - anxiety symptoms. This association results in negative health outcome, decreasing quality of life of obese individuals together with social life implications [1, 2].

## Conclusions

Increased waist circumference is significantly associated to depression and anxiety tendency in both genders. Increased waist circumference is associated to both depression and anxiety trend in men. The association between abdominal fat and depression trend is stronger than the association between abdominal adiposity and anxiety in women. This study is the first one proving that simply assessing accessible anthropometric parameters we can predict and eventually prevent depression and anxiety. Psychotherapy should be added to lifestyle changes in patients with abdominal adiposity. More studies assessing the association between normal weight obesity and depression risk and the relationship between behavioural patterns, basic individual personality types and obesity types, for a better understanding of psychosomatic diseases, would be also further needed.

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