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Association and comparison of signs/symptoms of depression with quality of life and anthropometric measures of university employees

Associação e comparação dos sinais/sintomas de depressão com a qualidade de vida e medidas antropométricas de funcionárias universitárias

Asociación y comparación de signos/síntomas de depresión con calidad de vida y medidas antropométricas de empleados universitarios

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Abstract
Objective: To evaluate the signs/symptoms of depression in university employees and to verify the relationship of these variables with quality of life and anthropometric and body composition variables. Methods: In total, 103 female employees of a university were evaluated, with a mean age between 36 and 40 years. Signs/symptoms of depression were assessed using the Beck inventory, quality of life (QoL) with the health status questionnaire (SF-36V2), and body composition with skinfolds. The anthropometric measures evaluated were weight, waist circumference (WC), and hip circumference (HC) and the body mass index (BMI) and waist-hip ratio (WHR) were calculated. Results: When evaluating women with/without signs and symptoms of depression, the groups with depression had higher BMI (Δ=1.93kg/m², p=0.019) and WHR (Δ=0.03, p=0.030). In the pairwise comparison, the group with severe signs/symptoms had mean scores below 50% for all QoL domains, except for functional capacity (Δ=26.94, p=0.007). All QoL domains were inversely related to signs/symptoms of depression. Conclusion: Women with signs and symptoms of depression present a higher BMI, a WHR above predicted values, and worse QoL compared to those without depression.
Keywords: Depression; Quality of life; Anthropometric measurements; Women; Adults.

Resumo
Objetivo: avaliar os sinais/sintomas de depressão em trabalhadoras universitárias e verificar a sua relação com a qualidade de vida e variáveis antropométricas e de composição corporal. Métodos: foram avaliadas 103 mulheres funcionárias de uma universidade, com média de idade entre 36 e 40 anos. Os sinais/sintomas de depressão foram avaliados com o inventário de Beck; a qualidade de vida (QV com o questionário de estado de saúde (SF-36V2), a composição corporal com as dobras cutâneas, e as medidas antropométricas avaliadas foram peso, circunferência da cintura (CC), circunferência do quadril (CQ); o do índice de massa corporal (IMC) e relação cintura-quadril (RCQ) foram calculados. Resultados: Quando avaliadas mulheres com/sem sinais e sintomas de depressão, os grupos com depressão apresentaram IMC (Δ=1,93kg/m², p= 0,019) e RCQ (Δ=0,03, p=0,030) mais elevados. Na comparação entre os pares, o grupo com sinais/sintomas graves apresentou scores médios abaixo de 50% para todos domínios da QV, exceto para a capacidade funcional (Δ=26,94, p=0,007). Todos os domínios da QV foram inversamente relacionados

com sinais/sintomas de depressão. Conclusão: mulheres com sinais e sintomas de depressão possuem o IMC mais elevado, RCQ acima do previsto, pior QV comparado àquelas sem depressão.
Palavras-chave: Depressão; Qualidade de vida; Medidas antropométricas; Mulheres; Adultos.

Resumen
Objetivo: Evaluar los signos/síntomas de depresión en empleados universitarios y verificar la relación de estas variables con calidad de vida y variables antropométricas y de composición corporal. Métodos: En total se evaluaron 103 empleados universitarios, con una edad media entre 36 y 40 años. Los signos/síntomas de depresión se evaluaron mediante el inventario de Beck, la calidad de vida (QoL) con el cuestionario de estado de salud (SF-36V2) y la composición corporal con pliegues cutáneos. Las medidas antropométricas evaluadas fueron peso, perímetro de cintura (CC) y perímetro de cadera (CC) y se calculó el índice de masa corporal (IMC) y la relación cintura-cadera (RCC). Resultados: Al evaluar mujeres con/sin signos y síntomas de depresión, los grupos con depresión presentaron mayor IMC (Δ=1,93kg/m², p=0,019) y RCC (Δ=0,03, p=0,030). En la comparación pareada, el grupo con signos/síntomas graves tuvo puntuaciones medias inferiores al 50% para todos los dominios de la CV, excepto la capacidad funcional (Δ=26,94, p=0,007). Todos los dominios de QOL estaban inversamente relacionados con los signos/síntomas de depresión. Conclusión: Las mujeres con signos y síntomas de depresión tienen mayor IMC, ICC por encima de los valores predichos y peor calidad de vida en comparación con aquellas sin depresión.
Palabras clave: Depresión; Calidad de vida; Medidas antropométricas; Mujeres; Adultos.

1. Introduction

Depression is an advent of the modern world, being the most common psychiatric problem in the world according to a report by the World Health Organization. It has a global prevalence of up to 27% (Wang et al., 2017), and mainly affects females (Lu et al., 2021). Recent epidemiological studies indicate that depression in women can reach up to 36.1% (Hadi et al., 2020a). Physiological mechanisms involving depression have been investigated, particularly the hypothalamus-pituitary-adrenal axis (HPA), since the secretion of corticotropin (CRH) drives the release of adrenocorticotropic hormone (ACTH), and the increase in the ACTH level stimulates the release of glucocorticoid by the adrenal cortex, increasing the concentration of cortisol, indicating that the severity of depression is linked to an increase in cortisol levels (Dziurkowska et al., 2013a). Thus, dysregulation of the HPA axis can be considered a central pathophysiological process, caused by depression (Asarnow, 2020; Dziurkowska et al., 2013b; Ye et al., 2019). In addition, evidence demonstrates the relationship of depressive symptoms with anthropometric measures for obesity and QoL (Iner Koksal et al., 2017; Jesus et al., 2021).

Research has been performed using anthropometric measurements WC, WHR, BMI, and body composition as markers of obesity to correlate with signs/symptoms of depression (Hadi et al., 2020; Iner Koksal et al., 2017; Klakk et al., 2018). However, BMI does not provide a precise estimate of the percentage of fat, and it is therefore important to assess body composition for more reliable results, since this variable is not related to signs/symptoms of depression (Tonello et al., 2019; Webb et al., 2017). In the study of (Jesus et al., 2021), depression was the dependent variable and did not present a correlation with the percentage of fat. Thus, results related to this topic are still only estimates, requiring further study.

It is worth mentioning that depression influences physical and mental aspects and it is believed that women are more affected due to hormonal factors, the double working burden, and dissatisfaction with their appearance. In addition, studies have investigated the relationship between depression and quality of life in women and have shown that a less favorable quality of life is found when signs/symptoms of depression are present (Anguzu et al., 2021; Jesus et al., 2021; Okyay, 2012).

Other factors that influence depression are low income, a lower educational level, and unemployment (Kiran Subba, 2010; Park & Kim, 2018). However, although employed women are less likely to develop depression, they have a lower quality of life (Baskan et al., 2016a); the fact the woman is employed means that she is within a social environment and has a fixed salary, consequently reducing the chances of acquiring depression. On the other hand, the lack of time, caused by work, limits time spent on her own health care, leading to a worsening in QoL.

The present study sought to evaluate women employed at a university because these women, in addition to having to work outside the home, also perform household chores at home, and this double working burden leads to a lack of time for them to take care of themselves, added to hormonal alterations suffered by females, which can even lead to distortion of body image, which increases the chances of acquiring signs/symptoms of depression. Another important point to be mentioned is that, due to the pandemic period, which the country went through during the research, the chances of depression caused by social isolation increased, especially for women (Pérez-Cano et al., 2020). To date, no evidence was found that related body composition, anthropometric measurements, and QoL with signs/symptoms of depression, so the current work expands on this topic. Thus, the objective of this study was to evaluate the signs/symptoms of depression in university employees and to verify the relationship of these variables with quality of life and anthropometric and body composition variables.

2. Methodology

Sample

This was a cross-sectional study, developed with female employees of a higher education institution. At the time of the research, the institution had 1726 employees, of whom 935 were women. Of these, 423 of these were approached and 103 agreed to participate in the study. The sample was for convenience and consisted of 103 healthy adult women, with a mean age between 36 and 40 (10.20) years. The inclusion criteria were being female, aged between 18 and 59 years, and being an employee of the institution since 2019. Those who did not complete all stages of the research, or who had any recent infectious or autoimmune diseases were excluded.

Sample calculation

The power calculation was performed in the free domain *GPower software* (version 3.1, *Universitat Dusseldorf*, Germany). Considering the analysis to be performed (comparison between two and three groups, categorical association, and multiple linear regression), a mean effect size of 0.15, significance level of 5%, sample loss of 20%, and the number of women evaluated (n=103), a power of 94% was found.

Study design

The project was approved by the Ethics and Research Committee on human beings of the Evangelical University of Goiás – UniEVANGÉLICA under number 4,441,878/2021. All employees who agreed to participate signed the Free Informed Consent Form.

Data were collected between January and June 2021, in the physiotherapy evaluation and intervention laboratory. The collection was carried out during the pandemic, and needed to be paused on two occasion due to the *lockdown*. First the sociodemographic data were collected, then the Beck depression questionnaire and the Sf-36 quality of life were applied, finally the anthropometric measurements (WC, HC) of body composition (%F) were collected.

Outcome variables

The dependent variables included the signs and symptoms of depression, while the independent variables were the anthropometric measures (WC, WHR, and BMI), body composition (%F), and quality of life domains.

Assessment Protocols

Sociodemographic data

Sociodemographic data were collected on age, education level, marital status, monthly income, smoking history, physical exercise, pre-installed comorbidities, and the climacteric period.

Anthropometric measurements

BMI was calculated (weight (kg) / height m^2) and individuals < 25 kg/m^2 were classified as eutrophic and ≥ 25 kg/m^2 as overweight/obese (World Health Organization, 1998). WC and HC were measured using an inextensible measuring tape (Sanny brand, model TR-4010 2m São Paulo, Brazil), and the WHR was calculated by dividing the WC/HC. The reference values considered for WC were ≥88 cm and for WHR < 0.76 cm, respectively (World Health Organization., 2008).

Body composition

The percentage of fat (F%) was evaluated according to the seven skinfold protocol developed for adult women (Jackson et al., 1980). The skinfolds evaluated were the triceps (TR), mid-axillary (MA), pectoral (PT), medial thigh (MT), subscapular (SE), suprailiac (SS) and abdominal (AB). An adipometer (Sanny brand, model AD1011-LD, São Paulo, Brazil) was used to pinch all the skinfolds, which were performed at least twice consecutively by the same evaluator. The equations used are described below and the values were interpreted according to (Jackson et al., 1980). Where: Σ7SF= sum of 7 skinfolds (SE + TR + PT + SS + SI + AB + MT). Equation 1: Body density = 1.097 – 0.00046971(Σ7SF) + $0.00000056(\Sigma 7SF)^2$ – 0.00012828 * (age). Equation 2 = Fat Percentage: %F= (495/SF) – 450 (SIRI, 1968).

Beck Inventory

The Beck questionnaire was used, which is self-administered questionnaire, containing 21 multiple-choice questions (Beck et al., 1961). A four-point *Likert* scale (0 to 3) was used for classification, where 0 means no symptoms and 3 means severe signs and symptoms. After completing the questionnaire, the points were added up and categorized as no depression (0 to 13 points), mild depression (14 to 19 points), moderate depression (20 to 28 points), and severe depression (29 to 63 points) (Gomes-Oliveira et al., 2012).

Quality of life

Quality of life was assessed using the *Short Form*-36 Questionnaire (SF-36) (Ciconelli et al., 1999). The questionnaire contains 11 multiple-choice questions concerning the previous four weeks. The domains evaluated were functional capacity (10 items), limitations caused by physical health problems (4 items), limitations caused by mental/emotional health problems (3 items), social function (2 items), emotional well-being (5 items), pain (2 items), vitality (4 items), and perception of general health (5 items). The scores of the SF-36 items were computed between 0 and 100, with the highest values corresponding to a better quality of life, and the lowest represent a less favorable QoL.

Data analysis

Data are expressed as mean, standard deviation, median, minimum, maximum, frequency, and percentages. To verify the normality of the data, the *Kolmogorov-Smirnov* test was used. To compare the groups (with and without signs/symptoms of depression) the t test for independent samples or the *Mann-Whitney* test was used. *One-way* ANOVA and the *Kruskal-Wallis* test were used to compare women classified with mild, moderate, and severe signs/symptoms and no signs/symptoms of depression. The chi-square test verified the categorical association between the presence of signs/symptoms of depression with

anthropometric, body composition, and quality of life measures. In addition, quality of life was classified according to the 50th percentile – P(50). A multiple linear regression was performed between the scores of the Beck inventory (dependent variable) with anthropometric parameters of body composition and quality of life (independent variables), with data adjusted for age and the presence of menopause. The p value considered was <0.05 and the analyses were performed in the *Statistical Package for Social Science* software (SPSS).

3. Results

Table 1 describes the sociodemographic characteristics of the women evaluated. The majority of participants had completed higher education and master's and doctoral levels (60.2%) and did not practice physical exercise (72.8%).

Table 1. Sample characterization (n=103).

Sociodemographic variables	Mean (SD) Med (min-max)
Age (years)	36.4 (10.2) 37 (18-59)
Body mass (kg)	67.2 (12.7) 65 (43 -111)
Stature (m)	1.6 (0.1) 1.6 (1.4 -1.8)
	n (%)
Level of schooling	
Elementary	02 (1.9)
Secondary	19 (18.4)
Incomplete higher education	20 (19.4)
Complete higher education	34 (33.0)
Postgraduate - Specialization	22 (21.4)
Master's or doctorate	06 (5.8)
Marital status	
Married	62 (60.2)
Divorced	03 (2.9)
Single	37 (35.9)
Widowed	01 (1.0)
Monthly income	
One salary	46 (44.7)
Two to three minimum salaries	39 (37.9)
Three to four minimum salaries	08 (7.8)
More than four minimum salaries	10 (9.7)
Smoking history	
Smoker	01 (1.0)
Ex-smoker	00 (0)
Never smoked	102 (99.0)
Physical exercise	
Practice	28 (27.2)
Does not practice	75 (72.8)
Comorbidities	
Respiratory	04 (4.0)
Cardiometabolic	02 (2.9)
Gynecological	02 (2.9)
Others	04 (4.0)
Drugs	
Contraceptives	13 (12.6)
Antidepressants	16 (15.5)
Anxiolytics	05 (5.0)
Others	04 (3.9)
Climacteric period	
Yes	11 (10.7)
No	92 (89.3)

Source: Authors (2022).

In the women in the current study (34%) presented signs/symptoms of depression. When comparing anthropometric measurements, the group with signs/symptoms of depression had higher scores for BMI (Δ=1.93kg/m², d=0.41) and for WHR (Δ=0.03, d=0.50) compared to the group of women without signs/symptoms of depression (Table 2). Regarding the quality of life domains, all scores were lower in the group of women who had signs/symptoms of depression. It is noteworthy that the domains emotional aspects (Δ= 26.77), vitality (Δ= 17.24), and general health (Δ= 12.62) presented mean values below 50% in women with signs/symptoms of depression.

BMI was higher (Δ=1.27 kg/m², p=0.009) in the group of women with moderate signs/symptoms when compared to those without signs/symptoms. Likewise, there was a tendency for WC (Δ=3.93 cm, p=0.060). Women with severe signs/symptoms all had lower quality of life scores when compared to those without signs/symptoms. Thus, in the comparison between pairs of groups without signs/symptoms and with severe signs/symptoms, except for functional capacity (Δ=26.94, p=0.007), all other domains had mean scores below 50%. The variation and effect size of the scores of the physical aspects (Δ=42.48, p=<0.001), general health (Δ=19.92, p=0.002), social aspects (Δ=23.26, p =0.002), emotional aspects (Δ=46.34, p=0.002), and mental health domains (Δ=22.27, p=<0.001) were classified as very large.

Only the pain domain (Δ=15.73, p=<0.001) had an effect size considered medium. The pain (Δ=18, p=0.017) and emotional aspects domains (Δ=21.91, d=0.50, p=0.042) were the only ones that presented lower scores for women with severe signs/symptoms in relation to women with moderate signs/symptoms.

Table 2. Comparison of anthropometric measures, body composition, and quality of life in women with and without signs and symptoms of depression (n=103).

	Classification of Beck Inventory Scores for Depression						
	With signs and symptoms (n=35)	Without signs and symptoms (n=68)		Mild (n=13)	Moderate (n=11)	Severe (n=11)	
Parameters	**Mean (SD) Med (min-max)**	**Mean (SD) Med (min-max)**	**p**	**Mean (SD) Med (min-max)**	**Mean (SD) Med (min-max)**	**Mean (SD) Med (min-max)**	**p**
Anthropometrics							
BMI (kg/m²)	27.1 (4.7) 25.8 (18 - 36)	25.1 (4.7) 24.4 (15 - 39)	0.019	28.1 (3.8) 26.9 (23 - 36)	26.4 (5.3) 25.0 (18 - 34)	26.8 (4.82) 25.8 (20 - 35)	0.056
WHR	0.8 (0.1) 0.8 (0.6 - 1.2)	0.8 (0.9) 0.8 (0.6 - 1.1)	0.030	0.8 (0.1) 0.9 (0.7 - 1.1)	0.8 (0.1) 0.8 (0.64 - 1.2)	0.8 (0.1) 0.8 (0.7 - 1.0)	0.425
WC (cm)	85.9 (13) 85.0 (63 - 119)	80.9 (11.9) 80.0 (62 - 119)	0.151	87.6 (12.7) 89.0 (75 - 119)	84.9 (14.6) 84.0 (63 - 112)	85.4 (12.2) 86.0 (65 - 108)	0.161
Body composition							
BF (%)	49.2 (13.4) 49.0 (21 - 8)	45.4 (11.8) 44.0 (16 - 71)	0.131	48.5 (10.9) 44.9 (33 - 69)	46.9 (13.3) 48.9 (21 - 69)	52.8 (16.0) 49.4 (31 - 83)	0.314
Quality of life							
Functional capacity	62.7 (30.6) 75.0 (15 - 100)	83.3 (18.7) 90.0 (0 - 100)	<0.001	71.8 (26.0) 80.0 (20 - 100)	60.4 (33.9) 75.0 (15 - 100)	56.4 (31.4) 50.0 (15 - 100)	0.008
Physical aspects	58.6 (44.5) 75.0 (0 - 100)	85.7 (30.3) 100.0 (0 - 100)	<0.001	68.9 (40.5) 100.0 (0 - 100)	63.5 (45.2) 75.0 (0 - 100)	43.9 (47.5) 25 (0 - 100)	0.004
Pain	55.8 (26.2) 61.0 (20 - 100)	55.2 (26.7) 73.0 (0 - 100)	0.006	70.9 (28.2) 71.0 (22 - 100)	57.5 (28.1) 62.0 (20 - 100)	39.5 (25.2) 30.0 (20 - 100)	0.004
Social aspects	56.8 (23.2) 50.0 (25 - 100)	69.9 (20.6) 75.0 (25 - 100)	0.005	59.1 (20.2) 50.0 (25 - 87.5)	63.5 (26.3) 50.0 (38 - 100)	46.6 (20.2) 37.5 (25 - 87.5)	0.010
Emotional aspects	43.8 (44.1) 33.3 (0.0 - 100)	70.6 (39.7) 100.0 (0 - 100)	0.003	60.6 (38.9) 66.7 (0 - 100)	46.2 (48.2) 33.3 (0 - 100)	24.2 (39.7) 0 (0 - 100)	0.007
Mental health	56.5 (20.2) 52.0 (12 - 96)	67.4 (15.9) 68.0 (28 - 100)	0.003	61.1 (18.2) 56 (36 - 96)	62.2 (19.3) 56 (44 - 96)	45.1 (20.1) 48 (12 - 72)	0.008
Vitality	41.1 (25.1) 40.0 (0 - 90)	58.4 (19.0) 57.5 (20 - 100)	<0.001	55 (17.8) 50 (35 - 90)	34.6 (23.8) 40 (0 - 80)	35 (29.1) 35 (0 - 90)	<0.001
General health	42.6 (16.9) 42 (15 - 75)	55.2 (18.2) 61 (15 - 92)	<0.001	47.4 (15.8) 52 (20 - 72)	44.7 (17.4) 37 (20 - 75)	35.3 (16.6) 32 (15 - 72)	0.005

Abbreviations: BMI= body mass index; WC= waist circumference; WHR= waist-hip ratio; %F fat percentage. Source: Authors (2022).

The association between categorical variables of anthropometric measurements, body composition, and quality of life of groups with and without signs/symptoms of depression are described in Table 3. The majority of women with signs/symptoms of depression were pre-obese/obese (65.7%). In the quality of life domains, all components showed a significant association, and most women scored values below P(50). There was a higher percentage of women with values below P(50) in the general health (p=0.002) and mental health (p<0.001) domains.

Table 3. Association between anthropometric measures, body composition, and quality of life domains in women with and without signs of depression symptoms (n=103).

	Women		**p**
	With signs and symptoms	**Without signs and symptoms**	
Parameters	n (%)	n (%)	
Anthropometrics and body composition			
Body mass index			
Eutrophic	12 (34.3)	41 (60.3)	0.012
Pre-obese/obese	23 (65.7)	27 (39.7)	
Waist circumference			
Adequate	19 (54.3)	51 (75.0)	0.033
Inadequate	16 (47.7)	17 (25.0)	
Waist-hip ratio			
Adequate	7 (20.0)	15 (22.1)	0.809
Inadequate	28 (80.0)	53 (77.9)	
%F			
Adequate	2 (5.7)	5 (7.4)	0.751
Inadequate	33 (94.3)	63 (92.6)	
Quality of life			
Functional capacity			
< P(50)	21 (60.0)	26 (38.2)	0.036
≥ P(50)	14 (40.0)	42 (61.8)	
Physical aspects			
< P(50)	19 (54.3)	15 (22.1)	0.001
≥ P(50)	16 (45.7)	53 (77.9)	
Pain			
< P(50)	23 (65.7)	28 (41.2)	0.018
≥ P(50)	12 (34.3)	40 (58.8)	
General health			
< P(50)	24 (68.6)	25 (36.8)	0.002
≥ P(50)	11 (31.4)	43 (63.2)	
Vitality			
< P(50)	21 (60.0)	19 (27.9)	0.002
≥ P(50)	14 (40.0)	49 (71.1)	
Social aspects			
< P(50)	21 (60.0)	19 (27.9)	0.002
≥ P(50)	14 (40.0)	49 (72.1)	
Emotional aspects			
< P(50)	20 (57.1)	20 (29.4)	0.006
≥ P(50)	15 (42.9)	48 (70.6)	
Mental health			
< P(50)	24 (68.6)	23 (33.8)	<0.001
≥ P(50)	11 (31.4)	45 (66.2)	

Abbreviations: WC= waist circumference; %F fat percentage; CI= Confidence interval; P(50)= 50th percentile. Source: Authors (2022).

The linear regression between the Beck Depression Inventory score and the anthropometric variables, body composition, and quality of life is shown in Table 4. The Beck Depression Inventory scores showed an inverse relationship for

all domains of quality of life. The social aspects (R^2= 12.8%), mental health (R^2=12.1%), and functional capacity domains (R^2= 11.1%) contributed most to these findings, with data adjusted for age and the presence of menopause.

Table 4. Multiple linear regression between age and the climacteric period as a dependent variable and anthropometric measurements, body composition, and quality of life domains as independent variables (n=103).

	Beck Depression Inventory Scores			
Parameters	β	CI (95%)	$R^2_{adjusted}$	p
Anthropometrics and body composition				
Body mass index	0.275	-0.14 - 69	0.5	0.192
Waist circumference	0.108	-0.48 – 0.264	0.4	0.172
Waist-hip ratio	12.121	-9.195 – 33.436	1.0	0.262
Fat percentage	0.099	0.056 - -0.254	0.6	0.207
Quality of life				
Functional capacity	-0.138	-0.209 - -0.067	11.1	<0.001
Physical aspects	-0.084	-0.131 - -0.036	8.9	<0.001
Pain	-0.106	-0.170 - -0.042	7.9	<0.001
General health	-0.172	-0.268 - -0.076	9.4	<0.001
Vitality	-0.145	-0.224 - -0.066	9.9	<0.001
Social aspects	-0.165	-0.244 - -0.086	12.8	<0.001
Emotional aspects	-0.080	-0.123 - -0.037	10.3	<0.001
Mental health	-0.198	-0.296 - -0.100	12.1	<0.001

Abbreviations: CI= Confidence Interval. Adjustment variables: Age and the climacteric period. Data for $p<0.05$. Source: Authors (2022).

4. Discussion

The main results of this study showed higher mean values of BMI and WHR for women with signs/symptoms of depression and, when categorized, there was an association of BMI with women who had signs/symptoms of depression. Multiple linear regression analysis showed that anthropometric and body composition measurements were not predictors of depression score. With regard to QOL, mean values were higher in women without signs/symptoms of depression when compared to those with signs/symptoms. When categorized according to the (50th) percentile, all domains of quality of life were associated with signs/symptoms of depression. In the pairwise comparison, women with signs/symptoms of depression had scores below 50% in all domains, except for functional capacity. Multiple linear regression analysis showed that all QoL domains were inversely related to depression questionnaire scores.

In the present study, it was found that women with signs/symptoms of depression had higher BMI and WHR. This result corroborates studies that compared healthy and obese people and indicated that the presence of obesity is associated with depression, specifically in women (Iner Koksal et al., 2017; Klakk et al., 2018). In view of the above, WC, WHR, HC, body fat percentage, and visceral fat percentage showed high levels in those with depression (Iner Koksal et al., 2017). On the other hand, evidence states that depressive symptoms are not associated with BMI, body fat percentage, and WC (Jin et al., 2017). When analyzing and comparing the groups of women, no significant difference was found in the fat percentage. One of the factors that justifies this finding may be the fact that there are few menopausal women in the sample. In this way, the literature supports that most menopausal women present mild depression, and that the Beck questionnaire scores for depression correlate with body fat and BMI (Barghandan et al., 2021).

Although, in this study, women with depression were shown to have higher BMI and WHR, when comparing means and proportions, WC was not shown to be related to depression. WC is an important marker to evaluate, as a study showed that WC was the best anthropometric indicator to correlate obesity with depressive symptoms and found an association between Beck scores with BMI and WC, but not with WHR (Moreira et al., 2007). This finding may be due to the women in the present

study having more distributed fat. (Hadi et al., 2020) also found a relationship between depression scores and higher WC and presented a logistic regression in which depression and anxiety had a positive relationship with WC, %F, and abdominal volume index, but did not find a relationship between depression and BMI. Although we did not find a relationship between depression and %F when comparing the proportions, most women with depression had a high %F.

It is worth mentioning that, although the results of this study did not show a relationship with WC, it is important that this parameter be evaluated, since several studies comparing people with and without depression, showed that people with depression, in addition to having obesity indices, such as high BMI and WHR, present a high WC compared to people without depression (Hadi et al., 2020c; Klakk et al., 2018b; Lasserre et al., 2014; Ma et al., 2013; Zhu et al., 2017). However, the literature associates depression with obesity markers, and this relationship may occur due to deregulation of the hypothalamic-pituitary-adrenal axis that leads to fat deposition, especially in the abdominal region (Brown et al., 2004; Holsboer, 2000; Young et al., 2003). Obese people release cortisol more rapidly compared to non-obese people, resulting in a positive *feedback* secretion of corticotropin (Brown et al., 2004; Holsboer, 2000; Young et al., 2003).

The result found in this study showed a prevalence of 34% of women with signs/symptoms of depression. In addition, studies have shown a prevalence of signs/symptoms of 3.5% of postmenopausal women <60 years (Park & Kim, 2018b), 35.3% employed, compared to unemployed, (Baskan et al., 2016), and 45.9% of military women (Kwon et al., 2021).

Evidence has shown a paradox in which the fact that a woman is employed reduces the risk of signs/symptoms of depression (Baskan et al., 2016b), income and educational level are also associated with depression scores (Kiran Subba, 2010; Park & Kim, 2018). It seems that having a professional life, a good job, financial independence, and greater contact with social and group activities are the reasons why these women have fewer signs/symptoms of depression (Baskan et al., 2016b). However, as found in the current study, the scores of reduced social aspects are inversely related to signs/symptoms of depression in the women evaluated. The position they hold within their work influences their QoL, as shown in a study carried out with military women, in which all of them had scores in the domains of poor mental aspects, but the officers, whose position requires more responsibility, were worse off compared to the non-commissioned officers. since demand and stress are greater (Kwon et al., 2021).

When compared to the means, all quality of life domains were lower in women with more severe signs and symptoms of depression. Some studies in the literature also indicate these results (Okyay, 2012); (Jafari et al., 2014), but in the present study, the scores were even lower. Monteiro et al. (2021) reported that the domains of pain, general health, functional aspects, and emotional aspects of quality of life do not present significant values among groups of women with depression.

Anguzu et al., (2021) reported that women with depression have lower scores in the physical and mental components, compared to those without depression of all ages. (Park & Kim, 2018)) also showed an association of mobility, usual activities, and pain QoL domains with signs/symptoms of depression, similar aspects to those reported in the present study, indicating that the scores of all QOL domains were associated with signs/symptoms of depression.

In data adjusted for age and the climacteric period, in order to verify the relationship between the scores of the Beck questionnaire and QoL, an inverse relationship was found between the scores of the Beck questionnaire and all domains of QoL. The literature indicates similar findings, showing a negative correlation of depression with all SF-36 domain scales, except for vitality (Frank et al., 2005). Another study showed that satisfaction, affection, poor health, negative feelings, and high levels of depression were associated with reduced QoL (Subba, 2010). Knowing that depression is associated with a decrease in role performance, such as poor job performance, unstable employment, and decreased earnings (Parker & Brotchie, 2010) it is evident that these findings become even clearer, as these aspects related to depression are directly linked to the domains of QoL.

It is worth emphasizing that the high prevalence of depression, especially in women, is related to difficulties such as a double working burden, menopause, hormonal alterations, and dealing with body image distortion, among others. Thus, over time, QoL domains tend to decrease with increasing age, and one of the domains that most influences this decline is physical functioning (Mishra et al., 2014).

The limitations that should be considered in these findings are related, firstly, to the lack of adherence of women to participation in the study, even with the expected sample power for generalizing the results. Second, the *lockdown* imposed on the time of collection because of COVID-19, at two moments. Third, although the literature indicates a relationship between anthropometric variables and signs/symptoms of depression, we were unable to find this relationship through linear regression, however, the study showed an association with high BMI when analyzed in a categorized way. Fourth, as this was a cross-sectional study, it was not possible to establish a cause-effect relationship. Finally, depression signs/symptoms and QoL were assessed using self-report questionnaires that may be subject to recall bias, despite being validated questionnaires used in several other studies. The strengths of this work are highlighted by the results reported here, as they provide relevant information for physicians and clinical researchers working with women, providing information to aid understanding of the impact of depression on women's QoL. The findings showed how depression has a direct influence on the quality of life of these women and that some simple interventions in life habits, such as maintaining socialization habits, and practicing physical activity to reduce pain and discomfort, can help to improve aspects of QoL.

5. Conclusions

Thus, the current study showed that women with signs and symptoms of depression have a higher BMI, WHR above predicted values, and worse QoL compared to those without depression. In addition, a relationship was found of all QoL domains with the Beck inventory scores. In view of these findings, it is extremely important that women maintain social interactions, and take care of their physical and mental health to improve their QoL domains and prevent the emergence of depressive symptoms. Regarding the future perspectives, highlight the importance stratified by BMI, develop a strategy to the practice of physical exercise, associated therapy (nutritional, psychological), exercise training protocol and assessment of the cardiorespiratory fitness, muscle mass and signs/symptoms of another mental disorder such as anxiety.

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