Brazilian women who practice resistance training more frequently present lower anxiety and depression scores

Mulheres brasileiras que praticam com maior frequência o treinamento resistido apresentam menores escores de ansiedade e depressão

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ABSTRACT

The aim was to verify the association between resistance training (RT) and related variables with anxiety and depression scores in Brazilian women. One hundred and fifty-four women practitioners of RT (40.9±8.6 years; 61.7±9.9 kg; 160.0±5.0 cm) and 113 non-practitioners (Control) participated in the study. Participants answered the *Hospital Anxiety and Depression Scale* and sociodemographic questions related to physical exercise. Statistical differences between groups occurred for anxiety (RT: 0.75±0.48 *vs.* Control: 1.07±0.57; P<0.001) and depression (RT: 0.84±0.34 *vs.* Control: 1.02±0.40; P<0.001). Weekly RT frequency significantly predicted anxiety [β=-0.165; *F*(1.138)=6.39; P=0.05] and depression [β=-0.213; *F*(1.138)=6.46; P=0.01]. We concluded that Brazilian women who practice RT presented lower anxiety and depression scores when compared to non-practitioners. In addition, a higher weekly frequency of RT predicted lower depression and anxiety scores in this population.

Keywords: Mental health. Strength training. Variables of training.

RESUMO

O objetivo deste estudo foi verificar a associação entre o treinamento resistido (TR) e variáveis relacionadas com escores de ansiedade e depressão em mulheres brasileiras. Participaram do estudo 154 mulheres praticantes de TR (40,9±8,6 anos; 61,7±9,9 kg; 160,0±5,0 cm) e 113 mulheres não praticantes de exercício físico (Controle) (39,0±8,0 anos; 64,2±11,2 kg; 160,0±6,0 cm). As participantes responderam à *Hospital Anxiety and Depression Scale* e questões sociodemográficas relacionadas ao exercício físico. Diferenças estatísticas ocorreram entre os grupos em relação à ansiedade (TR: 0,75±0,48 *vs.* Controle: 1,07±0,57; P<0,001) e depressão (TR: 0,84±0,34 *vs.* Controle: 1,02±0,40; P<0,001). A frequência semanal de TR foi preditora de ansiedade [β=-0,165; F(1,138)=6,39; P=0,05] e depressão [β=-0,213; F(1,138)=6,46; P=0,01]. Conclui-se que mulheres brasileiras que praticam TR apresentam menores escores de ansiedade e depressão quando comparadas à não praticantes de exercício físico. Além disso, maior frequência semanal de TR prediz menores escores de ansiedade e depressão nesta população.

Palavras-chave: Saúde mental. Treinamento de força. Variáveis de treinamento.

INTRODUCTION

Anxiety disorders affect 12% to 20% of the population and depressive disorders vary between 11% and 18%, resulting in an overload in the health care system[1]. Depression is a prevalent global burden, affecting more than 300 million people [2].

In the same scenario, the World Health Organization[3] reported that mental health conditions contribute to poor health outcomes, premature death, and global and national economic loss. Depression and anxiety disorders cost the global economy US$1 trillion/year and 800.000 deaths occur per year by suicide, disproportionately affecting young people and elderly women in low- and middle-income countries[3].

Women are nearly twice as likely to suffer from an episode of depression when compared to men, and are more at risk peri- and post-menopause when compared to pre-menopause[4]. Depressive disorders fall under the classification of mental and behavioral disorders and are associated with several cognitive dysfunctions, anxiety being one of them[5]. Such complications, if not treated, can lead to individual inaptitude, social imbalance, and suicide[3].

Even though the constructs of anxiety and depression are considered independent, their overlap is acknowledged both in practice and statistically[6]. Anxiety disorders include characteristics such as excessive fear, suffering in anticipation of a future threat, and related behavioral disorders[5]. Some anxiety disorders are developed during childhood and, if not treated, tend to persist during adulthood, being twice more frequent in women when compared to men[5].

According to Cheik *et al.*[7], anxiety and depression, characterized by transitory emotional states involving unpleasant feelings of tension, angst, and suffering, are psychological disorders that worry health care professionals. Therefore, their treatment encompasses traditional methods, either through the use of drugs and psychotherapeutic interventions, or environmental alternatives by adopting healthy lifestyle habits. Lifestyle quality is associated to three important pillars, being: sleep, nutrition, and the modulation of the environment with stress control and participating in physical activity programs[8]. The last pillar has shown to be an important contributor in the control and treatment of psychological functions and risk factors[9–13]. Most authors[11,12,14,15] highlight the importance of aerobic training, while others[16] have shown the effects of resistance training (RT) on psychological functions. Gordon *et al.*[17] found that RT significantly reduced depressive symptoms among adults regardless of health status, total prescribed

volume, or significant improvements in strength.

Health-promoting RT recommendations state that adults should exercise twice or more per week, at moderate or vigorous intensities and involve all muscle groups[18]. So, variables such as frequency, intensity, and duration of RT sessions are also important when quantifying scores regarding anxiety and depression, especially in women, since they present these disorders more often than men[4,5]. Therefore, the aim of the present study was to verify the association between regular RT and related variables with anxiety and depression scores in Brazilian women.

METHODOLOGY

STUDY DESIGN

The present study present a quantitative approach with a cross-sectional design. The sample was composed by randomly selected women, residents of the Vale do São Francisco region, in the Northeast of Brazil, specifically the cities of Petrolina-PE and Juazeiro-BA. The sample participated in RT programs at fitness centers (RT Group) or were non-exercise practitioners (Control Group). The instruments were answered individually and without the evaluators' interference during different times of the day. The evaluators were previously trained to perform face-to-face data collection. . After the training of the evaluators through a pilot study, data collection was performed for 30 days. The anonymity and confidentiality of the answers were guaranteed. The methods used in the present study were approved by the Ethics Committee of the Federal University of Vale do São Francisco under protocol number 0008/251011.

PARTICIPANTS

After signing an informed consent form, as requested by the Brazilian Health Council (Resolution number 466/2012), 267 women agreed to participate in the study and were divided in two groups, being: 1) RT group with 154 participants. Most of the volunteers had practiced RT for more than one year (54%), over three times a week (68.9%), for 45 to 60 min (54.3%) each session, at a moderate intensity (66.4%). It is worth highlighting that only non-athletes and women with at least three months of RT were included in this group. Women who declared using anti-depressives and/or anxiolytics were excluded from the study; and 2) Control group (non-exercise practitioners) with 113 participants. This group consisted of women who declared not engaging in any kind of physical activity. The general characteristics of the sample are shown in Table 1.

Table 1. Mean (±SD) of the general characteristics of resistance training (RT) and non-practitioning (Control) women

	RT (n=154)	Control (n=113)	F	df	P
Age (years)	40.9±8.6	39.0±8.0	0.288	1.259	0.592
Body mass (kg)	61.7±9.9	64.2±11.2	6.396	1.255	0.012
Height (cm)	160.0±5.0	160.0±6.0	0.373	1.255	0.542
BMI (kg.m$^{2(-1)}$)	24.0±3.6	25.2±4.5	3.091	1.251	0.081
Quality of sleep	2.58±0.6	2.50±0.6	1.007	1.264	0.316

BMI: Body mass index

MEASUREMENTS

Participants from both groups answered the *Hospital Anxiety and Depression Scale* (HAD) for anxiety and depression evaluation. This scale was originally created by Zigmond and Snaith[19] and validated in Brazil by Botega *et al.*[20], with satisfactory internal context indices for anxiety (α = 0.68) and depression (α = 0.77). It consists of a bi-dimensional scale, paper-and-pencil type test, with 14 items that measure the constructs of depression and anxiety from multiple-choice questions that vary according to each item, being seven for each disorder. The volunteers were requested to answer the questions based on how they felt during the last week. It was verified that its items were capable of evaluating these dimensions in several contexts, being successfully used in other studies[1,21]. In the present research, its validity was verified by conducting a factor analysis of the main axes (PAF); through this, it was possible to verify the presence of two factors (anxiety and depression), both with eigenvalues higher than one, construing 40% of the total variance, therefore indicating factorial validity of the measure. Furthermore, these factors showed satisfactory internal consistency indexes for the present context (anxiety: α = 0.77 and depression: α = 0.67).

In addition, participants also answered questions regarding social and demographic items, such as age, sex, body mass, and height. According to Fonseca *et al.*[22], self-reported anthropometric values present validity and reproducibility with measured values. Variables related to RT, such as time of practice (3-6 months; 7-12 months; or > 12 months), weekly RT frequency (1-2 days; 3 days; or > 3 days), and duration of the RT session (< 30 min; 30-45 min; 45-60 min; or > 60 min) were also investigated. The perception of RT intensity was also assessed, considering the intensities reported by the participants (low, moderate, or high). Previously to these reports, the participants were instructed to practice a memory recall regarding this variable, where the

evaluators led the volunteers to remember situations with low, moderate, or high efforts performed during their RT routine[23]. Other authors[8,24] have used this approach regarding the perception of intensity during exercise and have supported the validity of this method.

In order to better control sample selection, perceptions regarding quality of sleep[25] were also evaluated through a scale that considered the perceptions as bad, regular, or good for these variables. Also, questions regarding drug use were investigated in the studied group.

STATISTICAL ANALYSIS

After the descriptive statistics (mean, standard deviation, and percentage), in order to characterize the sample, an ANOVA was performed to compare the means of the anxiety and depression scores between the RT and Control groups. Considering the 267 participants evaluated in both groups, the Power for this statistical procedure was 0.93 (α = 0.01) with an effect size of 0.25 (medium). Afterwards, Pearson's linear correlation (r) was performed to quantify the associations between anxiety and depression, variables related to RT (time of practice, weekly frequency, duration and intensity of sessions). Considering the 154 participants in the RT group, for the mean of the identified correlations (r = 0.22), the Power for this statistical procedure was 0.80 (α = 0.05). Finally, a multiple linear regression (stepwise method) was performed to verify the prediction effects of the above cited variables using the anxiety and depression scores of the RT group as dependent variables. The model of multiple regression considered to adjust the results of body mass, body mass index, and quality of diet. The level of significance was set at P $\leq$ 0.05 and data were analyzed using the Statistical Package for the Social Sciences (SPSS/PASW), version 18.0.

RESULTS

Initially, when comparing age, body mass, height, and body mass index values of the RT and Control groups, no statistically significant differences were found (P > 0.05), with the exception of body mass (P = 0.012) (Table 1). On the other hand, anxiety and depression scores were significantly lower in RT when compared to Control group (P < 0.001; Figure 1).
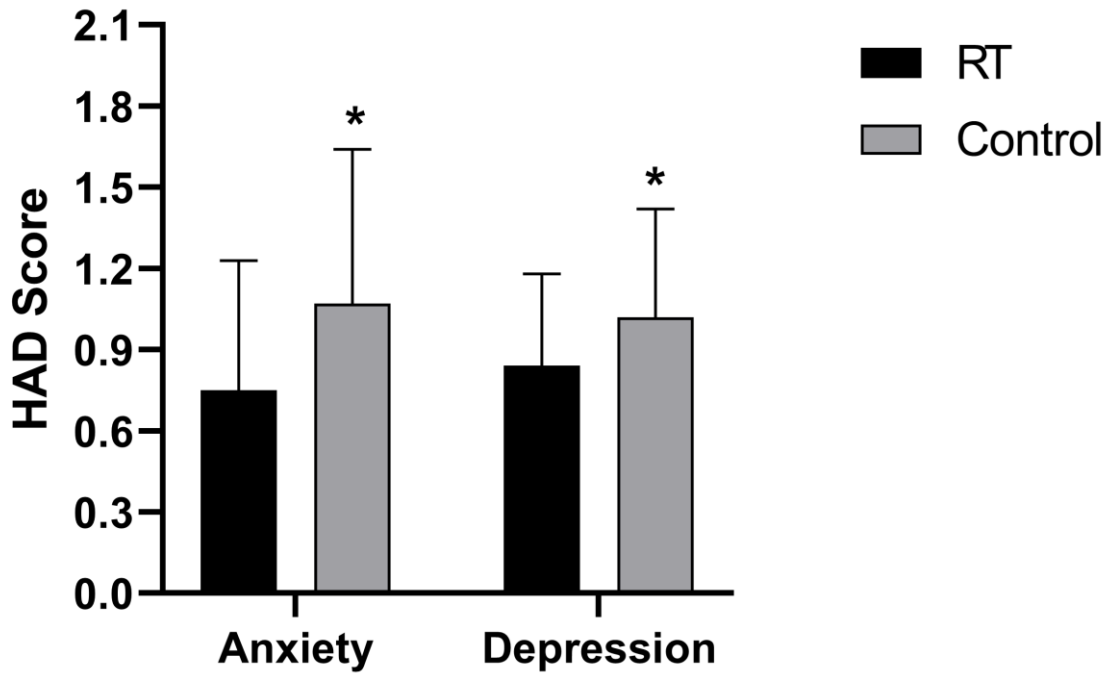
Figure 1. Mean (±SD) of anxiety and depression levels in resistance training (RT) group (n=154) and Control group (n=113). *P < 0.001 to resistance training group [Anxiety F = 15.095; df = 1.263 and Depression F = 25.131; df = 1.263]

Table 2 presents the correlation results between anxiety and depression and the variables related to RT.

Table 2. Correlations (r) between anxiety and depression and RT variables in women (n=154)

Variables	Anxiety	Depression
Time of RT practice	-0.04	-0.12
Weekly RT frequency	-0.21*	-0.22**
Duration of RT session	-0.09	-0.06
Intensity of RT	0.05	-0.14*

RT: Resistance training. *P<0.05; **P<0.01

Table 3 shows that weekly frequency of RT significantly predicted anxiety [F (1.138) = 6.39; P < 0.01)] and depression [F (1.138) = 6.46; P < 0.01)] in Brazilian women.

Table 3. Multiple stepwise regression for prediction of anxiety and depression in women who practice resistance training (RT)

DV	IV	R²	β	t	P
Anxiety	Weekly RT frequency	0.08	-0.165	-1.98	0.050
Depression	Weekly RT frequency	0.04	-0.213	-2.54	0.012

RT: Resistance training; DV: Dependent variable; IV: Independent variable. Adjusted results to body mass, body mass index, and quality of diet

DISCUSSION

The aim of the present study was to verify the associations between regular RT and related variables with anxiety and depression scores in Brazilian women. The main findings indicated that RT practitioners presented lower anxiety and depression scores when compared to non-practitioners (Figure 1). In addition, a higher weekly frequency of RT predicted lower depression and anxiety scores in women (Table 3).

These results corroborated with the triad related to the modulation of lifestyle quality in general population, where exercise is an important factor in the phenomenon[8–10,14,15]. Few studies have investigated the effectiveness of RT in mental health and the results found are still controversial[16,17,26]. Such interventions, like the ones investigated in the present study can significantly contribute to the population's quality of life, reduce the overload on health care services and, consequently, lower public costs, and reduce social unbalance[2,3].

Bampton, Johnson, and Vallance[27] analyzed that RT, regardless of sedentary time, was significantly associated with health-related quality of life and psychosocial factors, such as satisfaction with life, level of self-esteem, anxiety, and depression. Bibeau et al.[26] examined the positive and negative effects of different intensities and recovery periods during resistance exercise on anxiety, while holding volume constant and controlling for self-efficacy, suggesting that the variation of intensity and recovery time had a modest short-term effect on psychological states, following an acute bout of resistance exercise. In the present study, variables such as intensity and weekly frequency can (or not) be decisive when the goal involves controlling and treating cognitive disorders like depression. Vizza et al.[28] evaluated the psychological outcomes of 12 weeks of low to moderate-intensity progressive RT (supervised and unsupervised) in women with polycystic ovary syndrome and the intervention group had beneficial effects regarding anxiety and depression.

Even though the present study has important findings, it is not without limitations. For instance, variables related to socioeconomic status (such as income, level of education, profession, among others), as well as levels of possible hormones related to anxiety and depression were not measured. On the other hand, the measure used for evaluating anxiety and depression (HAD scale) has been validated

in the context of the sample investigated with satisfactory internal consistency indices for both disorders[20]. Moreover, several studies have successfully used the same scale in their investigations[1,21].

As future perspectives, more studies are necessary in order to clarify any neurophysiological mechanisms that could explain the present findings. In addition, more investigations in vulnerable samples with different genders, age and submitted to other stressful environments than the ones in the present study would help to better understand this phenomenon.

CONCLUSION

In conclusion, women who practice RT presented lower anxiety and depression scores when compared to non-practitioners. Moreover, a higher weekly frequency of RT predicted lower depression and anxiety scores in Brazilian women.

Therefore, the results found in the present study have a practical application to mental health care professionals, especially the ones who work directly with RT prescription for women. These professionals can benefit from the information herein to better program the RT's periodization during the training cycle. Among the variables of training, in Brazilian women, the weekly frequency of RT presented itself as a major condition when the aim of exercising consists of

minimizing mental health issues, such as anxiety and depression.

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