



# Functional exercises improve quality of life of obese depressed women: a case report study.

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## ABSTRACT

**Background:** Depression is characterized by abnormal affective manifestations. This pathology is more frequent among women and is aggravated with the overweight/obesity. Regular exercises have been shown to combat the manifestations of depression, as well as to increase active behavior and improve the morphology. **Objectives:** This study aimed to evaluate the effect of functional training on morphology, physical activity level and quality of life of obese women with depression. **Methods:** Four women with mean aged  $32.5 \pm 10.6$  underwent 2 months of functional training, which performed twice a week, each session 1-hour training. Participants were evaluated in 3 times (T): T1 pre-test; T2) at the end of first month (mid-test); and T3) at the end of the second month (post-test). **Results:** We observed significant changes for the waist circumference variable, and presented a reduction in mid-test and post-test, in relation to the pre-test ( $p < 0.05$ ). No changes were observed for the variables weight and BMI. It was observed a significant increase in the level of physical activity, with the mid-test and post-test in relation to the pre-test (mid-test:  $p < 0.05$ ; post-test:  $p < 0.01$ ). All the indices evaluated by the SF-36 questionnaire showed improvement at mid-test and post-test relative to the pre-test ( $p < 0.05$ ). **Conclusions:** The present study suggests that engagement in functional training programs provides a significant improvement in aspects related to quality of life and depression, as well as an increase in the level of physical activity, even in the absence of weight reduction.

**Key Words:** Physical Exercise; Depression; Functional Training; Obesity.

## INTRODUCTION

Depression is characterized by abnormal affective manifestations that have their variances in relation to their intensity and symptoms duration<sup>(1-3)</sup>. Depression is intrinsically linked to low self-esteem, lack of pleasure, defeatist thoughts, social isolation and lack of appetite; also often compromises motor and cognitive abilities, which result in decreasing quality of life (QOL)<sup>(4,5)</sup>. Epidemiological research in multicultural reports that women are twice as likely to develop depression than men<sup>(6)</sup>. Considering obesity showed that the likelihood of women developing depression increase even more, whether due to perception of self-image<sup>(7,8)</sup> or metabolic factors influenced by fat excess accumulation<sup>(9,10)</sup>. Other different variables such as age, residence area, socio-demographic situation, social status and marital status, may also be associated with the onset of depression<sup>(1,11)</sup>.

Depression significantly affects the QOL<sup>(12)</sup> and is related to decreasing in active behavior and increasing in sedentary lifestyle levels, in which may exacerbate the symptoms of depression<sup>(13)</sup>. Several forms of treatment have been developed to combat this pathology, in which among non-pharmacological treatments the regular practice of

physical exercises is more highlighted<sup>(14,15)</sup>. The adherence and maintenance of physical activity lead to benefits for people with depression, which feelings of pleasure, met expectations and improvement in self-determination factors are examples of them<sup>(13,16)</sup>. Some studies have demonstrated that physical exercise has the potential to provide improvements in various symptoms of depression<sup>(17,18)</sup>, improving QOL and the level of spontaneous physical activity<sup>(19)</sup> which being used as a non-pharmacological treatment. Weight loss and morphological changes caused by regular exercise also have a positive influence on depression<sup>(20,21)</sup>. As a type of physical exercise, functional training (FT) is characterized as a multicomponent exercise, which several joints and muscle groups are involved in a single exercise for improving transposition of the exercise to daily living tasks<sup>(22)</sup>. The FT is an alternative for conventional training, which presenting good results for adherence and morphological changes related to physical exercise, such as loss weight<sup>(23)</sup>, decrease of cardiac pathologies, and decrease of waist circumference (WC)<sup>(24)</sup>.

Taking into account the increase in cases of depression and obesity among women<sup>(6)</sup>, and the beneficial effects of the

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exercise<sup>(13)</sup>, we believe in the importance of understanding how the FT effect on both of them. Therefore, this study aimed to evaluate the effect of functional training on the QOL, physical activity level, Body Mass Index (BMI) and waist circumference (WC) of obese women with depression diagnostic.

## METHODS

### Participants

Four adult women (age= 32.5 ± 10.6 years, height= 1.59 ± 0.05 m), were evaluated. All the participants were recruited, evaluated and trained in a gym in Indaiatuba city, São Paulo, Brazil. As inclusion criteria, the participants must have presented obesity (BMI> 30) and medical report confirming a condition of depression. The intervention was composed by functional exercises that duration two months, with two weekly sessions lasting one hour each session. The evaluations were composed by BMI, WC measures and questionnaires in 3 different times (T). The participants were evaluated at: T1) the pre-intervention (pre-test), T2) at the end of the first month (mid-test), T3) at the end of the second month (post-test). Data were collected following the ethical principles as stated in the declaration of Helsinki proposed by the world association of physicians. The project behind this study was submitted and authorized by the research ethics committee of the Municipal Hospital Dr. Mário Gatti under protocol No 2.847.951.

### Consent

Written informed consent was obtained from the patient for publication of this Case report and any accompanying images. A copy of the written consent is available for review by the Editor of this journal.

### BMI and WC measures

Body weight was measured by a digital scale (Omron - HBF514). Body height and WC was measured by a tape, following the recommendations of the literature for WC<sup>(25)</sup>. The BMI was calculated as weight in kilograms divided by height in meters squared.

### Questionnaires

The IPAQ (International Physical Activity Questionnaire) short form questionnaire was used in this study<sup>(26)</sup>. This questionnaire measures indirectly the level of physical activity during a week. The formula by Barbara Bushman<sup>(27)</sup>, was used to express IPAQ results in kilocalories that spent per week. Also we used the SF-36 questionnaire, which evaluates the QOL and perception of depressive syndrome from the participants' point of view. The SF-36 evaluates following eight health concepts: functional capacity, physical appearance, pain, general health, vitality, social aspects, emotional aspects

and mental health<sup>(28)</sup>. All the questionnaires were applied in the three times of evaluations.

### Physical training

The program comprised of two one-hour sessions per week, over 8 weeks. Each session incorporated:

- 20 minutes of general warm up: Stretching exercises of lower, upper limb muscles and aerobic exercises (walking): subjects worked at their own pace.
- The main part of session (functional training) was divided in 3 blocks of 10 minutes for each one, which included: 1) lower limbs exercises; 2) upper limbs exercises; and 3) core muscles exercises (abdominal and lumbar region) were performed. During exercises execution the rating of perceived exertion (RPE) responses were used, to predict the internal load and exercise intensity of participants<sup>(29)</sup>.
- Sessions finished with a 10-minute cool-down period and relaxation exercises.

### Statistical analysis

Data are presented as mean and standard deviation. Normality of the data was verified through the Shapiro-Wilk test<sup>(30)</sup>. The One-way ANOVA test was used to compare the three times (pre x mid x post) tests. When the interaction effect was found, the Bonferroni post hoc was used. The significance level which used was  $p \leq 0.05$ . All statistical analysis was carried out with IBM SPSS Statistics 23.0.

## RESULTS

During the two months physical training period, no significant differences were observed in relation to the BMI ( $p = 0.45$ ) and body weight ( $p = 0.14$ ) variables. It was a significant difference in WC, and the post hoc showed a significant reduction in mid-test ( $p = 0.04$ ) in relation to pre-test, which this reduction was maintained at the post-test ( $p = 0.002$ ). There were no significant differences between moments mid-test and post-test for WC ( $p = 0.06$ ). The values can be observed in table 1.

All dimensions of the SF-36 questionnaire presented significant differences which include: physical aspects, pain, general health status, vitality, social aspects and mental health. All of these dimensions presented similar dynamics, with improvement from pre-test to mid-test ( $p < 0.05$ ) and maintenance these significant differences from mid-test to post-test ( $p < 0.05$ ). No significant difference between mid-test and post-test was identified for any of the SF-36 dimensions ( $p > 0.05$ ). For the Emotional Aspects dimension, the student t-test was used to make a direct comparison between pre-test and post-test, since the mid-test did not present any variance (all responses reached the maximum score of 100).

**Table 1.** Morphological variables

Variables	Pre-test	Mid-test	Post-test
Weight (Kg)	96.9±24.5	88.4±23.1	85.8±23.4
BMI (kg/m <sup>2</sup> )	34.6±6.6	34.2±8.2	36.5±8.8
WC (cm)	105.5±27.2	100.8±26*	96.2±26.4*

Note: BMI- body mass index, WC- waist circumference. \* p≤0.05, with respect to the pre-test.

**Table 2.** Quality of life questionnaire (SF36) scores

Aspects	Pre-test	Mid-test	Post-test
Emotional Dimension	8.3±16.7	100±00	100±00**
Functional capacity	48.8±2.5	93.8±9.5*	97.5±5*
Physical aspects	18.8±23.9	93.8±12.5*	99.8±0.5*
Pain	42±22.7	89±13.6*	89±13.6*
General health status	31.8±23.1	77.8±19.8*	77.8±25*
Vitality	26.3±22.9	85±10.8*	90±4.1*
Social aspects	34.4±25.8	96.9±6.3*	93.8±7.2*
Mental health	31±26.8	86±10.6*	82±6.9*

Note: \* p≤0.05, with respect to the pre-test. \*\* p≤0.01, with respect to the pre-test.

**Table 3.** International Physical Activity Questionnaire results

	Pre-test	Mid-test	Post-test
IPAQ (Kcal/weekly)	3971±4645.6	6726.1±5306.6*	7010.7±5815.7**
RPE	6.8±0.5	7.3±0.5	7.1±0.9

Note: IPAQ- international physical activity questionnaire, RPE- rating of perceived exertion. \* p≤0.05, with respect to the pre-test. \*\* p≤0.01, with respect to the pre-test.

The t-test identified a significant difference ( $p=0.001$ ) higher at post-test ( $100\pm0$ ) than the pre-test ( $8.3\pm16.7$ ) (table 2).

The level of physical activity was measured using the IPAQ questionnaire with the activity time converted Kcal through the Bushman equation<sup>(27)</sup>. When we evaluated the general caloric expenditure, we observed a significant increasing from the pre-test to mid-test ( $p=0.02$ ) and from the pre-test to the post-test ( $p=0.01$ ). No significant difference was found between the mid-test and post-test ( $p>0.05$ ). The RPE assessment did not present a significant difference between the moments ( $p=0.48$ ) (table 3).

## DISCUSSION

The objective of this study was to evaluate the effect of a functional training program on the BMI, WC, QOL and physical activity level in obese women with depression. As main result, we found that even in the absence of weight and BMI changes, QOL and physical activity level increased significantly and remained high in the second month.

Conventional two months functional training has been shown to affect positively the BMI and WC variables<sup>(31)</sup>. However, in the present study, only WC demonstrated

significant changes. The WC is directly linked to the incidence of metabolic and cardiovascular diseases, being circumferences above 88 cm for women considered harmful to health<sup>(24)</sup>. Although the average value at the end of the second month (post-test) for WC was 96.25 cm, which still represents health risks, we highlight the decrease of 8.7% in relation to the pre-test. This drop, besides being significant, demonstrates beneficial effect that the functional training brings to the participants.

In a recent study<sup>(32)</sup>, demonstrated that 6 weeks of functional training was due to increase the basal metabolism of sedentary women without significant changes in their body composition. In study<sup>(32)</sup> the basal metabolism was evaluated indirectly through the composition of expired gases. In the present study we evaluated the weekly caloric expenditure and found significant changes between the pre-test and mid-test, and pre-test and post-test. This increase and maintenance of weekly caloric expenditure demonstrates a greater engagement of participants in voluntary activities during the week. It has been reported that the practice of physical activity has the ability to alter the behavior of individuals in a way that expresses a more active behavior, thanks to the changes caused in the control nuclei of the habit<sup>(33)</sup>. Although



studies have focused on the effect of exercise on QOL through the SF-36 questionnaire and found positive results<sup>(34,35)</sup>, it is not unanimous that physical exercise can improve the QOL in women<sup>(36)</sup>. Although depression is a rising disease, studies that investigate the effects of this pathology on young and obese women are scarce<sup>(37)</sup>.

In the present study, it was found that all dimensions of the SF-36 questionnaire improved from the pre-test to the mid-test and remained elevated at the post-test. This is a positive effect of physical exercise on aspects related to QOL, even in people with depression and obesity, which are factors known to negatively influence the QOL<sup>(13)</sup>. There are several factors that may be related to the improvement of depressive and mood symptoms, which affect aspects of QOL in general. These factors include psychological and physiological factors and are influenced by physical activity<sup>(13)</sup>. Among the psychological factors we highlight the following theories: Hypothesis of distraction, Theory of self-efficacy and Hypothesis of social interaction<sup>(13)</sup>. Among the physiological factors, we highlight the following hypotheses: the monoamine hypothesis, endorphin hypothesis and thermogenesis hypothesis<sup>(13)</sup>. It is more likely that the practice of regular physical activity crosses between these theories, influencing as much in the improvements of the psychological as in the physiological aspects.

The main limitation in this study was sample size, which in too small sample size is difficult to find significant relationships from the data, as statistical tests normally require a larger sample size to ensure a representative distribution of the population and to be considered representative of groups of people to whom results will be generalized or transferred. There is a necessity to continue the study on a larger group of obese depressed women to confirm the results of this study. Future studies should investigate different aspects among men and women obese depressed.

## CONCLUSION

The results found in this study suggest that the effect of personalized functional training during two months has a strong influence on the depressive state in obese women, promoting improvements in all aspects in the SF-36 questionnaire. We also found that this improvement cannot be explained only by morphological changes, since only the WC variable presented a significant change, but rather by a complex interaction between psychological and physiological factors.

### AUTHOR'S CONTRIBUTION:

Acquisition of data and drafting the manuscript: JFB, DP, DT, JBP, VEG; Analyzed and interpreted of data: JFB, SA; Review the literature and wrote: DP, DT, JBP, VEG, SA; Approved final of the version to be published: JFB, DP, DT, JBP, VEG, SA.

### CONFLICT OF INTEREST:

Nothing to declare.

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