THE EFFECTS OF MULTIDISCIPLINARY TREATMENT ON THE FUNCTIONAL CAPACITY AND QUALITY OF LIFE IN OBESE, ELDERLY WOMEN

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Abstract: *Objectives:* To verify the impacts of a multidisciplinary program on aerobic capacity, strength, weight loss, and quality of life, as a treatment for obesity among the elderly. *Methods:* Women (≥ 60 years old) with a body mass index (BMI) ≥ 30 kg/m² participated in this noncontrolled clinical trial. For six months, 22 patients received geriatric and nutritional assistance and performed supervised physical activity twice a week. Lower limb strength was quantified through the Guralnik sit-to-stand test (SST), aerobic capacity was measured during a 12-minute walk/run test (12MWT), quality of life was measured by the abbreviated version of the World Health Organization Quality of Life (WHOQOL-BREF) questionnaire, and body composition, by electrical bioimpedance. *Statistical Analysis:* Student's t-test was applied for dependent samples and analysis of variance was used for repeated measures. *Results:* Initially, the patients presented a BMI of 36.79 (5.26) kg/m² (average [standard deviation]), a fat mass (FM) of 42.41% (3.4%), a 12MWT distance of 963.9m (123.6m), and an SST of 8.71s (3.93s). After the intervention, there was an average reduction of 6.74% (2.9%) (p = 0.034) in body weight and an average BMI of 34.28 (4.83) kg/m2 (p = 0.047), largely due to a reduction of FM (40.27% [4.43%]; p= 0.008). There were improvements in the 12MWT (1081.95 [168.56] m; p<0.001), in the SST (7.72 s [2.86]s, p=0.047) and the WHOQOL-BREF as well as in the general (+38.2%, p<0.001), physical (+21.7%, p = 0.001), and social (+12.9%, p = 0.003) subscores. The reduction of body weight had a positive correlation with the improvement in the physical domain of the WHOQOL-BREF (r = 0.50; p =0.018). The SST decreased just between the patients with a weight loss ≥ 5% (p = 0.028). *Conclusions:* Elderly patients who underwent multidisciplinary treatment for obesity lost weight and improved their physical capacity and quality of life.

Key words: Obesity, aging, physical function, quality of life, diet, exercise.

Introduction

Obesity is a global epidemic (1) that is increasing at an alarming rate among all age groups (2). In addition to being associated with an increase in mortality, obesity is a risk factor for conditions related to aging, such as cancer, dementia, cardiovascular diseases, and physical disabilities (2).

For decades, a multidisciplinary approach has been recommended in its treatment (3), and there is a general agreement that a change in eating habits and regular physical exercise are key steps in reducing and maintaining weight (4). Weight loss among elderly, obese individuals is related to a decrease in inflammatory markers (5) and a reduction in the incidence of diabetes (6). However, it may also lead to a decrease in bone density (7), and the implications for cardiovascular diseases (6, 8), and mortality (9, 10), are unclear.

Improving physical capacity and quality of life has been considered the most important objective of the treatment of obesity among the elderly (2). Various studies associate obesity with a lower quality of life, and weight reduction programs may be associated with its improvement (2, 12, 13).

There is strong evidence that an elevated BMI contributes to a decline in functional capacity (14, 15) mainly in association with sedentarism. However, a recent systematic review of long-term interventions for weight loss among the elderly (6) found a mere three studies that included an evaluation of physical capacity and only two that evaluated the quality of life, with no conclusive results.

The objective of this study was to verify the impacts of multidisciplinary treatment of obesity in terms of body weight and composition, functional capacity, and the quality of life of obese elderly patients.

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Methods

Study design and sample characterization

This open, non-controlled clinical trial was conducted during 2006. Patients were recruited through advertisements in the hospital and by medical referral.

The eligibility criteria consisted of being female, at least 60 years old, with a BMI greater than or equal to 30 kg/m^2. The exclusion criterion was presenting clinical restrictions on supervised physical activity.

For six months, the patients received medical and nutritional assistance and engaged in supervised physical activity. The nutritional orientation included a diet with a caloric deficit of 500 kcal per day, group classes in nutritional education (1h/week), and monthly individual appointments. The supervised physical activity (1h, twice a week) consisted of low-intensity resistance exercise, without machines, for 30 min and walking at a moderate pace, also for 30 min. Medical treatment consisted of monthly individual appointments, with a focus on controlling comorbidities and a change in lifestyle.

This project was approved by the Ethics Commission for Analysis of Research Projects of the Faculdade de Medicina, Universidade de São Paulo, Brazil. The data were collected after the subjects provided informed consent.

Initial characteristics

Initially, we collected data on the following: age at the beginning of the program, education in years of study, and diagnoses of chronic diseases according to medical chart reviews.

Anthropometric data

Body weight was measured without shoes and with light clothes. Height was measured with a fixed stadiometer, and abdominal circumference was determined in the horizontal plane, at the middle point between the last rib and the anterior superior iliac spine (16). Fat mass (FM) and fat-free mass (FFM) were determined by bioimpedance (17) (BIA 101Q, RJL Systems, Detroit, MI, USA).

The BMI was calculated as weight divided by height squared (kg/m^2), and the patients were classified as obese class 1 (30 kg/m^2 ≤ BMI < 35 kg/m^2), class 2 (35 kg/m^2 ≤ BMI < 40 kg/m^2), or class 3 (BMI ≥ 40 kg/m^2) (1). For determining treatment response, the patients were divided into groups based on weight loss greater or less than 5% (18).

Quality of life

The abbreviated version of the World Health Organization Quality of Life (WHOQOL-BREF) (19) questionnaire was applied. Two questions were on the subject's general quality of life, and the other 24 were distributed among four domains (physical, psychological, social relationships, and environment). The scores in each domain had a range of 0 to 100.

Functional capacity

The sit-and-stand up on a bench test (SST) evaluates the strength of the lower limbs and consists of sitting down and getting up from a chair five times in a row in the smallest amount of time possible. The average time of three attempts was used (20).

The 12-minute walk/run test (12MWT) is a field test to evaluate aerobic capacity, and consists of covering the greatest possible distance in 12 minutes (21).

Statistical analysis

Differences in pre- and post-intervention data were analyzed by a paired t-test or by its non-parametric equivalent. An impact analysis stratified by percentage of weight loss (22) was performed by repeated measures of analysis of variance. The data were analyzed using the Statistical Package for the Social Sciences, version 13.0. The data are presented as averages and standard deviations. A p value ≤ 0.05 was accepted as statistically significant.

Results

Of the 24 elderly women selected, 22 completed the program. One subject did not return after the initial tests and the other fractured her tibia in a fall unrelated to the intervention. Table 1 describes the sample at the beginning of the study according to the socio-demographic and anthropometric data, as well as the average variation after six months.

Table 1
The socio-demographic and anthropometric characteristics of the study subjects at the initial evaluation and the average variation after six months of multidisciplinary treatment for obesity. Sao Paulo, Brazil, 2006

Variable	Average initial (sd)	Average variation (sd)	P value
Age	65.6 (4.1)	-	
Years of education	5.6 (3.5)	-	
No. of chronic diseases	7.7 (2.1)	-	
Anthropometric data			
Weight (kg)	87.7 (10,0)	-3.77 (2,33)	0.003†
BMI (kg/m^2)	36.8 (5.26)	-1.60 (1.00)	0.005†
Body fat (kg)	37.0 (5.77)	-3.00 (2.70)	<0.001†
FFM (kg)	50.6 (5.34)	-0.78 (3.70)	0.266‡
Abdominal circumference (cm)	108.4 (9.03)	-1.94 (3,03)	0.003‡

sd = standard deviation; † P value for variation calculated by the Wilcoxon test; ‡ P value for variation calculated by the t-test.

Table 2

The performance measures of the patients before and after six months of multidisciplinary treatment for obesity measured by the WHOQOL-BREF questionnaire and descriptive levels of the models of analysis of variance according to weight loss. Sao Paulo, Brazil, 2006

Variable	Loss ≥ 5% (n = 10)		Loss < 5% (n = 12)		Analysis of variance (p)	
	Initial	6 months	Initial	6 months	Time	Time-group
Functionality						
12MWT	922.8 (137.4)	1045.5 (194.7)	1005.0 (98.0)	1118.4 (138.3)	<0.001	0.830
SST	10.26 (5.33)	7.93 (3.17)	7.41 (1.50)	7.55 (2.71)	0.047	0.028
Quality of life						
General	56.25 (16.93)	77.50 (17.48)	56.25 (17.27)	78.13 (21.40)	<0.001	0.892
Physical domain	53.93 (11.96)	66.79 (12.03)	58.33 (17.78)	69.94 (15.79)	0.002	0.855
Psychological domain	70.00 (7.03)	68.33 (9.46)	58.33 (18.80)	64.24 (24.65)	0.386	0.129
Social domain	70.00 (15.81)	78.33 (14.27)	59.72 (15.01)	68.06 (14.58)	0.007	1.000
Environmental domain	58.75 (13.32)	60.63 (11.62)	59.90 (13.77)	64.06 (17.50)	0.382	0.738

*in the 12 minute test, n = 10 for the loss < 5% group.

Twelve of the obese patients were considered class 1, seven had class 2 , and three had class 3 obesity. All the patients presented a clinical diagnosis of symptomatic osteoarthritis, 72.7% (16) had hypertension, 59.1% (13) had dyslipidemia, 31.8% (7) had type 2 diabetes, 40.9% (9) had glucose intolerance or impaired fasting glucose, and 36.4% (8) had depression.

At the end of the treatment, decreases were noted in body weight (p = 0.003), abdominal circumference (p = 0.003), and body fat (p < 0.001). However, reductions in FFM were not found (p = 0.266). In the 12MWT, the average initial distance of the group was 963.9 m (123.6), and the average final distance was 1081.95 m (168.56), an improvement of 12.2% (p < 0.001). In the SST, there was an improvement of 11.3% (p = 0.047). The initial and final average times of the SST were 8.7 s (3.93) and 7.72 s (2.86), respectively.

Figure 1 presents the average scores on the WHOQOL-BREF questionnaire before and after the intervention. There were improvements in the general questions (+38.2%, p < 0.001), and in the physical (+21.7%, p = 0.001) and social relationship (+12.9%, p = 0.003) domains.

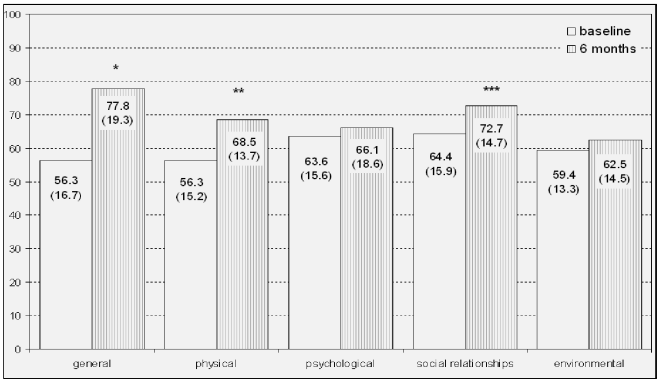

Figure 1. Average scores on the WHOQOL-BREF questionnaire before and after six months of multidisciplinary treatment for obesity among elderly patients. Sao Paulo, Brazil, 2006. Data on average (standard deviation). * p <0.001; ** p = 0.001; ***p = 0.003

Table 2 presents data on the effects of weight loss on patients' functional capacity and quality of life. Ten patients lost 5% or more of their weight. There was no difference between the two weight loss groups in terms of baseline anthropometric variables, functional capacity, or quality of life (data not shown).

One patient did not appear for the final 12MWT, and the other had the test interrupted due to dizziness. Both had a weight loss of less than 5%. An improvement was observed in the 12MWT (p = 0.001) over time, without a difference between the groups. In the SST there was difference between groups: the improvement only occurred in the group of patients with a weight loss ≥ 5% (p = 0.028) (Figure 2).

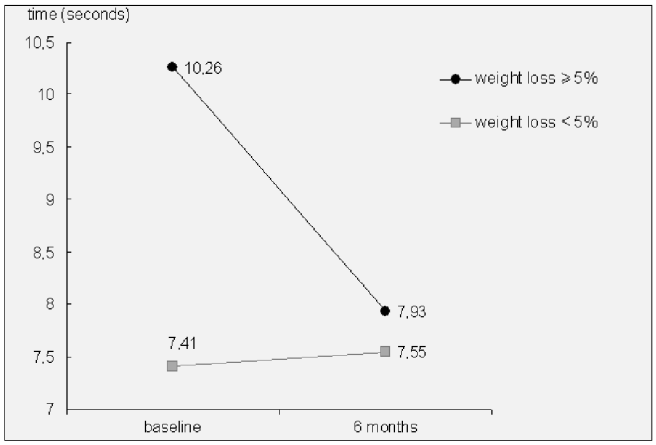

Figure 2. Subjects' performance according to the weight loss in the sit-and-stand on a bench test, before and after six months of treatment. Sao Paulo, Brazil, 2006.

Discussion

The short-term effects of caloric restriction and physical exercise on weight reduction are well established (6, 23). Our intervention produced a modest, yet significant, reduction in body weight, a decrease in

abdominal circumference, and a decrease in body fat, as has been observed in other studies (24-28).

In addition to weight loss, the FFM was preserved, indicating an improvement in body composition. Losses of FFM and muscular force are some of the most feared effects of weight loss among the elderly. Resistance exercise has frequently been combined with diet as a strategy to minimize this risk (29). However, there are studies that included resistance exercise more intense than ours but nonetheless produced losses in FFM (25, 27). A study by Frimel (2008) (27) on fragile, obese, elderly patients and significant weight reduction (~10%) is interesting. There was a loss of FFM in both the group that underwent caloric restriction alone and the group that added resistance exercise. In the latter group, however, the loss was reduced by half, and there was an increase in muscle strength. It is possible that reductions in FFM are associated with the intensity of caloric restriction (Frimel (27): 750 kcal/day; Miller (25): 1000 kcal/day).

The functional capacity of the patients also improved in our study. The average distance in the 12MWT was similar to that observed in other studies that used shorter field tests (24, 25, 30), and the average velocity did not change during the performance of the tests (data not shown). The improvement in aerobic capacity was also in line with similar studies composed mainly of women (24, 25). Although we did not find a correlation between weight loss (~4.3%) and aerobic capacity improvement (~12%), it is possible to see a gradient of response between both when compared to other studies. Messier (2004) (24) obtained a 13% improvement in the six-minute test with a slightly higher weight loss (~5.2%). Miller (2006) (25) used an intervention involving a caloric restriction of 1000 kcal/day and obtained a reduction in weight of 8.5% and an improvement in the six-minute test greater than 16%, with a significant correlation between the two. Despite consistent evidence regarding the debilitating effects of aerobic capacity among obese elderly individuals (31), there remains a need for studies that specifically evaluate the dose-response effect between weight reduction and the improvement of aerobic capacity.

There was also an improvement in lower limb strength. The relationship between the caloric restriction associated with resistance exercise and the improvement in functional tests is well established (35). When we stratified the sample, we observed that the improvement occurred only in those individuals with a greater weight loss. One possible explanation for this fact is that greater weight losses are necessary for an improvement in lower limb strength among obese elderly patients, especially in those diagnosed with joint problems (25), due to the reduction of the load on the knees (32) and the improvement of self-sufficiency and in pain symptoms during daily activities (33). In addition, the relationship between BMI and functional capacity appears to be stronger among women (34).

Regarding quality of life, we observed that the initial scores of our patients were lower in all domains when compared with healthy elderly patients (35) or those with multiple morbidities (36). The scores were similar to those patients on hemodialysis (37). The improvements in the general perception of health and quality of life and in the physical and social domains is in accordance with the literature, which primarily describes an improvement in the quality of life related to health after treatment for obesity (13, 14). The intervention included frequent contact with health professionals and group activities, which stimulated the formation of social links and may explain the improvement in social relationships. The improvement in the physical domain was related to the reduction of body weight ($r = 0.50$; $p = 0.018$; data not shown) and may have occurred because of the improvement in functional capacity. However, we did not verify a difference in the physical domain between the groups showing higher and lower weight losses.

One of the limitations of this study was the lack of a control group. However, it is unlikely that the results only occurred due to time passing because it is expected that body composition and functional capacity worsen over time. Other limitations were the small number of participants and the short intervention time. Studies of greater duration are necessary to evaluate the long-term effects of this type of intervention (6).

The findings of this study show that elderly women who received multidisciplinary treatment for obesity lost weight and improved their functional capacity and quality of life, reinforcing the benefits of this approach and the need to offer these resources to a broader segment of the elderly population.

Conflict of interest: None of the authors had a conflict of interest in relation to this manuscript.

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