Journal of
Obesity & Weight Loss Therapy

Ivar Carneiro et al., J Obes Wt Loss Ther 2012, 2:3
DOI: 10.4172/2165-7904.1000124

Research Article Open Access

Impact of an Exercise Program for Morbidly Obese Patients on Quality of Life and on Clinical and Metabolic Profile

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Abstract

Purpose: This study aims to assess the short-term effects of a preoperative program of exercises developed for the morbidly obese, on their quality of life within clinical and metabolic parameters.

Methods: Thirty seven consecutive patients were enrolled. Twenty-three completed the study and had the following parameters assessed before the start and at the end of the program: Stanford Health Assessment Questionnaire - Disability Index (HAQ – DI) and Moorehead Ardelt Quality of Life Questionnaire II (MA QoLQII); the six-minute walk test (6MWT); and clinical-metabolic assessment.

Results: Nineteen patients (82.6%) lost weight with the program. Cholesterol and LDL cholesterol levels were lower at the end of the program (166.78 ± 22.47 mg/dl *versus* 179.52 ± 31.30 mg/dl, $p < 0.05$ and 87.02 ± 20.21 mg/dl versus 108.73 ± 31.27 mg/dl, $p < 0.01$, respectively). The distance covered during the 6MWT was higher at the end of the program (556.26 ± 42.27 m versus 528.34 ± 44.56 m, $p < 0.01$). Quality of life questionnaires had better scores at the end of the program.

Conclusion: The practice of regular physical activities is feasible for morbidly obese patients, and leads to beneficial effects on lipid profile and on the quality of life.

Introduction

In the last few years, obesity has been a major issue in the media and in the scientific environment. Until then, it was considered a disorder of minor clinical importance. The scientific community itself considered obesity a disorder related to poor habits and self discipline – an obese person would be totally lacking in willpower and fully responsible for his/her clinical condition. Today, we know that obesity is a chronic, multifactorial origin disease [1] whose treatment is extremely difficult, especially if we consider the results after long periods of observation [2].

The life expectancy of the morbidly obese is shortened by their clinical-metabolic condition, [3] with a potential risk of mortality up to 12 times higher than non-obese individuals, in the 25 –34 age group [4], Morbidly obese patients are less sensitive to behavioral or medication therapy [5]. Equally important is the significant impact that excess body weight may have on quality of life, especially in relation to issues of mobility and deambulation. For this reason, the term "morbid obesity" was coined in 1963, when Payne & DeWind were searching for a way to justify to U.S. insurers the use of surgical resources for the treatment of extremely obese people [5].

Many studies have been published praising the clinical-metabolic benefits of weight loss resulting from bariatric surgery, but few have focused on assessing the impact of routinely physical activities on this population, perhaps due to the difficulty of imagining the safety of morbidly obese patients with all their possible limitations as well as co-morbidities, during exercise.

To improve to the quality of life of those patients through non-surgical methods is essential, especially because of the difficulty they face when they resort to the Brazilian Public Health System in search of surgical treatment. In 2006 the Unified Health System (SUS) - the Brazilian Public Health System, performed just over 2500 bariatric surgeries throughout the National Territory [6]. Although underestimated, this number is quite low, given the increasing prevalence of morbid obesity in our country, and explains the extensive waiting lists for bariatric surgeries in the various authorized centers in Brazil. Even in richer countries, such as the United States, a large portion of patients do not receive operations for different reasons [7]. Despite the lack of more detailed studies on the status of patients on waiting lists for surgeries, we know that very few services offer opportunities for improvement in morbidly obese health conditions through a multidisciplinary approach.

The purpose of this study was to assess the effects of a physical activity program developed for the morbidly obese patient, on the metabolic parameters of weight loss, functional capacity, and on quality of life.

Patients and Methods

Thirty seven consecutive patients (BMI between 38.8 and 64.6 kg/m^2), on the waiting list for bariatric surgery at the Clementino Fraga Filho Hospital (HUCFF – UFRJ) from May 11, 2005 to July 11, 2006 were included in the study as they were admitted to our service. Patient data were collected at the initial stage of the study and an average of 90.39 ± 20.53 days after the first collection (range 55 - 123 days). All patients had no regular physical activities for at least 3 months prior.

Physical activity program

A previous assessment was conducted in all patients by the team cardiologist to evaluate the possibility of enforcing the proposed physical activity program. The program was divided into two phases: The first one, with average duration of 30 days, comprises specific work

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Received March 26, 2012; **Accepted** April 12, 2012; **Published** April 14, 2012

Citation: Ivar Carneiro JR, da Cruz GG, do Valle Quaresma J, Xerez D, de Oliveira JEP (2012) Impact of an Exercise Program for Morbidly Obese Patients on Quality of Life and on Clinical and Metabolic Profile. J Obes Wt Loss Ther 2:124. doi:10.4172/2165-7904.1000124

activities and stimulation of the respiratory dynamics, stretching and flexibility exercises. In the second phase, the patients performed mainly aerobic activities, such as walking and low-impact ground exercises. The activities were performed twice a week at the HUCFF Physiatry service gym center, always under the supervision of physical therapists and the support of the medical team; each session lasted 1 hour on average. Those attending at least two-thirds of the scheduled activities were considered apt and ready to remain in the study and to have their data collected at the end of the program. The patients were given some educational material so that they could maintain some activities at home.

Nutritional guidance

Patients attended three brief lectures with the official nutritionist on the adoption of good eating habits and were told to follow a standard diet of 2264.72 kcal (carbohydrates 53.46%; protein : 18.3% ; fat: 28.21%).

Anthropometric assessment

Patients were weighed in the morning barefoot and with light clothes in a pre-calibrated Filizola scale with capacity up to 300 kg with subdivisions of at least 100 grams. Height was measured with Harpender stadiometer with subdivisions up to 0.1 cm. BMI was calculated from the weight and height.

Six-minute walk test

The six-minute walk test (6MWT) was conducted on a 26-meter track with monitoring by at least one cardiologist and one physical education professional according to previously described methodology [8]. All patients repeated the test after 30 minutes of rest. The analysis considered the results from the test of better performance. Blood pressure was measured before each test and 1 minute after that, on the dominant arm while the patient was sitting at rest and with the arm supported. We also measured: heart rate (HR), oxygen saturation (O_2 Sat), using a Nonin calibrated wrist oxymeter (Onyx Finger Pulse Oximeter 9500) and subjective tolerance to physical effort using the Borg scale [9] at time: zero, 2 minutes, 4 minutes and 6 minutes as well as 1 minute after the end of test. The following variables were calculated for a better assessment of the test: covered distance (in meters - m), average speed (in kilometers per hour – km/h) and energy expenditure (in metabolic equivalents - Mets). The percentage of the lower limit of the distance (LLD) forecast for the 6-minute walk test (PLLD) was calculated from the formulas [10]: LLD for males = (7.57 x height in cm) – (5.02 x age) – (1.76 x weight in kg) – 309 meters. LLD for females = (2.11 x height in cm) – (2.29 x weight in kg) – (5.78 x age) + 667 meters.

Quality of life questionnaires

The following quality of life questionnaires were applied at the start and at end of the study:

- Stanford Health Assessment Questionnaire Disability Index (HAQ – DI) [11]
- Moorehead Ardelt Quality of Life Questionnaire II (MA QoLQII) [12]

These are self-explanatory, easily understood questionnaires, which were answered by the patients after brief explanation by the health professional.

Weight loss assessment

In addition to the measure of amount of lost weight in kilograms, the percentage of excess weight lost (%EWL) and the percentage of excess BMI lost (%EBMIL) were also calculated following the recommendations of the International Federation for the Surgery of Obesity to assess the outcome of the surgical procedure [13].

Laboratory analysis

Blood samples were collected and stored at - 70°C for subsequent measurement. Laboratory dosages were performed by the DNA group. Glycated hemoglobin was measured by high-performance liquid ion-exchange chromatography (Katal Biotecnológica). Glycemia, cholesterol and triglyceride were measured by an automated colorimetric method (Katal Biotecnologia). HDL-cholesterol was measured by a method using precipitation for automated enzymatic determination (Katal Biotecnológica). Gamma glutamyl transferase (Gamma-GT), AST and ALT were measured by a kynetic method (Katal Biotecnológica). Fibrinogen was measured by a coagulometric method (Wiener Laboratories). Insulin was measured by chemoluminescence (DPC Laboratories). The HOMA-IR index was calculated with the formula HOMA-IR = insulin (mCU/ml) x glycemia (mmol/l) / 22.5 to convert milligrams per deciliter into millimoles per milliliter mmol/ml; glycemia results (miligrams per decilliter) were multiplied by 0.05551 [14].

Statistical treatment

The data collected from all patients were analyzed by SPSS version 11.0. Student's t test was used for comparisons between groups (the start versus the end of the program). Non-parametric tests were applied for analyses of scale variables: the Wilcoxon tests were used for dependent samples. The correlation analysis used Pearson's R or Spearman *rho* according to the type of variable (parametric or non parametric, respectively). A value of two-tailed $p < 0.05$ was considered significant.

Results

Fourteen patients (37,84%) left the study before its end. Six of them didn't report any reason for that; six patients had particular problems during the program and could not complete at least two-thirds of the scheduled activities. One patient was excluded because of decompensated hypothyroidism, and other patient was excluded because of a recent diagnosis of hepatitis C.

Twenty-three patients (62,16% - BMI between 38.82 kg/m^2 and 64.59 kg/m^2) completed the study and had their data analyzed (Figure 1).

Descriptive analysis of the patient group (n = 23)

The average age of patients was 37.6 ± 8.1 years (24 to 53 years) - 16 (69.5 %) females and 7 (30.4 %) males. Weight varied between 99.4 and 209.3 kg (137.2 ± 26.4 kg). BMI varied between 38.8 and 64.5 kg/m^2 (49.6 ± 6.9 kg/m^2). In this group, 11 patients (47.8%) had high blood pressure and only 1 patient (4.3%) was diabetic.

Results of the physical activity program

Impact on weight and BMI: The patients' weight and BMI were lower at the end of the exercise program then at the start (Table 1). Out of the 23 patients studied, 19 (82.6%) lost some weight with the program; 3 patients (13.04%) gained some weight, and 1 female patient (4.44%) showed no change in her weight. The average weight loss of the

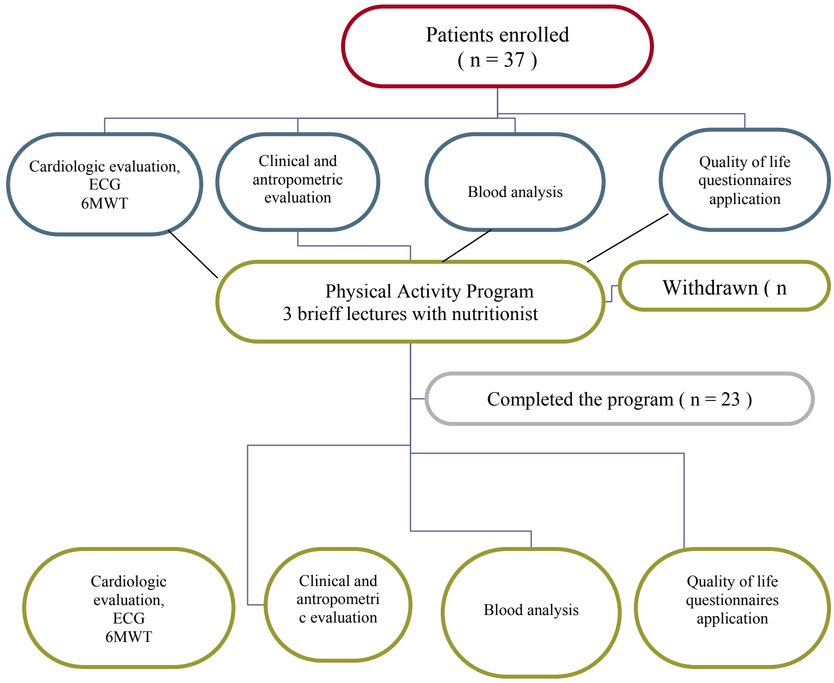

Figure 1: Trial profile.

Parameter	Start of Program	End of Program	p value
Weight (kg)	137.20 ± 26.42	132.11 ± 25.28	<0.01
BMI (kg/m^2)	49.66 ± 6.93	47.98 ± 6.10	<0.01

Data are means ± DP.

Table 1: Average Weight and BMI at the start and at the end of the Program (n = 23).

sample was 5.09 ± 7.43 kg, varying from a minimum loss of – 10.5 kg (referring to the patient who gained the most during the preparation) to a maximum of 23.0 kg, lost by one female patient. When we assessed the %EWL, we found an average of 6.91 ± 9.32% (minimum of – 14.3% and maximum of 30.1%). At the %EBMIL assessment we found an average of 6.43 ± 8.73% (minimum of – 14.1% and maximum of 25.51%).

Impact on the six-minute walk test: When the 6MWT results were compared before and after the enforcement of the program, we found an increase in the distance covered, in the average speed and in energy expenditure at the end of the program as compared with the start. We found a trend towards increased PLLD and O2 Sat after a post-test 1-minute rest at the end of the program compared with the start (Table 2). There was no correlation of any of the three parameters used to assess weight loss (weight difference, % EWL and % EBMIL) with the difference between the covered distance during the second and first 6MWT (r = 0.21, p = 0.33; r = 0.24, p = 0.26; and r = 0.13, p = 0.54, respectively).

Impact on quality of life questionnaires: When we assessed the scores of HAQ-DI questionnaire, we found lower values, indicating decreased severity, at the end of the program. The scores values of MA QoLQII were higher (better) at the end of the program compared to the start (Table 3). We found a positive correlation between the improvement of HAQ-DI scores, and the amount of weight loss as assessed by weight difference, %EWL and %EBMIL (rho = 0.52, p = 0.01; rho = 0.51 p = 0.01 and rho = 0.42 p = 0.04, respectively). We found no correlation between MA QoLQII score improvement and the amount of weight lost as assessed by weight difference, %EWL and %EBMIL, (rho = 0.31, p = 0.14; rho = 0.35 p = 0.09; and rho = 0.21 p = 0.32, respectively).

Impact on clinical and metabolic profile: When comparing the results of laboratory analyses before and after the Physical Activity Program, we found lower values of total cholesterol and LDL cholesterol at the end of the program than at the start. Fibrinogen values were higher at the end than the start of the program. No differences were found in the values of the other variables studied (Table 4). Analyzing variables exhibiting changes between the start and the end of the program, we found correlations with weight loss measurement parameters: the difference observed in the total cholesterol values between the start and the end of the program was non-significantly but still somewhat strongly correlated with the amount of weight loss, %EWL and %EBMIL, (r = 0.37, p = 0.07; r = 0.37, p = 0.081 and r = 0.36, p = 0.088, respectively). The difference in the LDL-cholesterol values between the start and end of the program correlated non-significantly with the amount of weight loss, and significantly with the % EWL and the % EBMIL (r = 0.40, p= 0.052; r = 0.42, p = 0.043 and r = 0.41, p = 0.047, respectively).

Discussion

Initial considerations about the study

The acceptance of physical activity programs, especially those involving guidance for exercises performed at home, can be surprisingly

Parameter	Start of Program	End of Program	p value
Distance 0-6 min (m)	528.34 ± 44.56	556.26 ± 42.27	< 0.01
Speed 0-6 min (km/h)	5.28 ± 0.44	5.56 ± 0.42	< 0.01
Mets 0-6 min	3.52 ± 0.21	3.66 ± 0.20	<0.01
PLLD	141.81 ± 17.38	145.24 ± 20.12	0.07
Basal HR (bpm)	89.17 ± 13.41	86.91 ± 13.96	0.46
6-Minute HR (bpm)	141.82 ± 18.01	139.04 ± 16.77	0.56
Rebound HR (bpm)	112 ± 17.20	108.82 ± 18.44	0.46
HR drop after 1 minute of rest (bpm)	29.82 ± 13.98	30.21 ± 11.75	0.91
Basal O2 sat (%)	97.13 ± 1.45	97,39 ± 1.33	0.37
6-Minute O2 sat (%)	95.56 ± 2.35	95.65 ± 2.67	0.86
Rebound O2 sat (%)	97.30 ± 1.01	97.73 ± 0.91	0.08
Basal Borg	0.30 ± 0.61	0.15 ± 0.27	0.37
6-Minute Borg	3.15 ± 1.78	2.45 ± 1.61	0.15
Rebound Borg	1.97 ± 1.25	1.78 ± 1.52	0.57

Data are means ± DP

Table 2: Six-Minute Walk Test Parameters at the start and at the end of the Program (n = 23).

Parameter	Start of Program	End of Program	p Value
HAQ-DI	1.04 ± 0.68	0.51 ± 0.45	<0.01
MA QoLQII (sum)	0.078 ± 1.49	1.57 ± 1.0	<0.01
HAQ-DI (disability classification)	Light: 12 (52.2%) Moderate: 9 (39.1%) Serious: 2 (8.7%) Poor: 5 (21.7%)	Light 22 (95.7%) Moderate: 1 (4.3%) Serious (----) Poor: (---)	<0.01
MA QoLQII (quality of life classification)	Satisfactory: 12(52.2%) Good: 2 (8.7%) Very Good: 4 (17.3%)	Satisfactory: 7 (30.4%) Good: 8 (34.6%) Very Good: 8 (34.6%)	<0.05

Data are means ± DP

Table 3: Quality of Life Assessment Parameters: HAQ-DI and MA QoLQII (before and after the program).

Parameter	Start of Program	End of Program	p Value
SBP (mmHg)	123.30 ± 14.73	123.56 ± 16.60	0.92
DBP (mmHg)	84.34 ± 11.60	82.26 ± 12.15	0.28
Hb A1C (%)	6.47 ± 1.04	6.18 ± 0.85	0.27
INSULIN (mcU/ml)	11.84 ± 4.69	13.76 ± 9.00	0.86
Glucose (mg/dl)	90.69 ± 17.55	91.86 ± 17.95	0.78
Cholesterol (mg/dl)	179.52 ± 31.30	166.78 ± 22.47	<0.05
Triglyceride (mg/dl)	105.56 ± 35.07	98.13 ± 39.20	0.40
LDL cholesterol (mg/dl)	108.73 ± 31.27	87.02 ± 20.21	<0.01
HDL cholesterol (mg/dl)	49.69 ± 11.49	51.92 ± 8.45	0.36
GGT (U/L)	35.13 ± 26.01	29.56 ± 15.09	0.34
TGO (U/L)	24,56 ± 14.88	22.82 ± 11.56	0.34
TGP (U/L)	24.95 ± 14.99	23.30 ± 11.02	0.38
Fibrinogen (mg/dl)	253.56 ± 21.87	266.34 ± 23.57	<0.05
HOMA-IR Index	2.72 ± 1.67	2.86 ± 1.99	0.78

Data are means ± DP

Table 4: Clinical and Biochemical Parameters Before and After the Program.

high when obese patients are assessed [15]. Although there is evidence that excess weight may adversely interfere with physical activities [16]; even the morbidly obese, despite their limiting conditions can have their cardio-respiratory capacity within normal limits [17], what fully justifies the applicability of a physical activity program to this group of patients. Even at the initial phase of our study, all patients exceeded their minimum distance limitation for the 6MWT, established through specific calculation [10].

On analyzing the decrease in body weight, we noted that most patients (82.6%) had lost some weight. The regular practice of physical exercises is essential for the success of obesity treatment programs [18]; including when the effect on the prevention of weight gain is assessed [19]. Even the performance of physical activities involving minor energy expenditure, when sustained for a few months, can be considered an important differential in therapeutic strategies towards weight loss [20]. We believe that physical exercises practiced regularly and safely can also be recommended to morbidly obese patients.

Analysis of 6MWT results

On analyzing the parameters studied in the 6MWT, we found a significant improvement in patients' performance. The PLLD measurement was higher in the second test (trend), although the lower limit of the distance forecast for the 6-minute walk test was higher in the patients who lost weight, because the weight measurement is used for the calculation of that variable [10]. It has already been demonstrated that there is an inverse relation between the distance covered at the end of the 6MWT and mortality in patients with left ventricular dysfunction [21] and pulmonary hypertension [22]. Although the literature reports no similar studies in the morbidly obese, we can consider such improvement an important finding, precisely because the optimization of deambulation in the immediate postoperative period of a bariatric surgery can contribute to the decrease of deep venous thrombosis, an unequivocal risk factor for pulmonary embolism, one of the most feared complications of surgical techniques used in the treatment of morbid obesity [23]. A study carried out by Maniscalco et al. [24] showed an improvement of the 6MWT parameters in the late postoperative period of bariatric surgery. In those cases, a positive correlation was observed between the weight loss resulting from the surgery and the improvement of the analyzed parameters. In our study we found a slight correlation between the amount of weight loss, the %EWL and the %EBML obtained with the program and the improvement of parameters analyzed in the 6MWT. Therefore, we can suppose that the better physical condition but not the amount of weight loss itself resulting from the training might have been the determining factor for the improvement of such parameters. Furthermore, the improvement in the parameters of the 6MWT did not imply changes in the values of heart rate and oxygen saturation. We believe that a longer study, perhaps involving a comparative analysis with a control group, would have more potential to confirm our assumption.

Findings referring to quality of life questionnaires

It is not difficult to imagine the impact that morbid obesity can cause to a human's quality of life. Directly associated with several clinical-metabolic disorders, such as high blood pressure, diabetes mellitus, bronchial asthma, sleep apnea, dyslipidemia and different types of cancer (colon, prostate, endometrium and breast) [25], obesity also causes other equally important inconveniences. In the United States, obesity predominates among the low-income and low-education populations, and such a trend is especially noted in American women [26]. In Brazil in the early 1990s, excess weight was already more prevalent in lower socioeconomic segments of the population [27]. Access to food with lower energy content and the regular practice of exercises – important factors to maintain a healthy weight and indicators of a better lifestyle are not part of everyday life of a large part of the Brazilian population. It is also interesting to mention the observation made by Yach [28] that elements associated with decreased quality of life could also be considered factors accompanying the increase in the prevalence of obesity in modern societies. In that study, longer daily commute for females, the habit of eating in restaurants, higher cost of healthy food and decreased energy expenditure in leisure and daily activities were found to be factors linking obesity to decreased quality of life.

Obese people are usually discriminated against by their peers, [29] and this often begins in childhood [30]. Morbidly obese people have trouble finding job on equal grounds with thin individuals [31]. The weight loss from bariatric surgery optimizes the work conditions of the patients and consequently leads to an increase in their yearly earnings [32].

Another important factor is the impact of obesity on the quality of the sexual life. Morbidly obese people have impaired sexual activity and this may be associated with a decrease in sex drive among this group of individuals [33]. On analyzing the quality of life of our patients and the impact of the preoperative program on the scores of the questionnaires used to assess this issue, we noted a significant improvement in the scores of the HAQ-DI Questionnaire. In the studied group, we also noted an improvement in the classification of the degree of physical disability in the realm of sexual activity. The amount of weight loss was positively correlated with the improvement obtained in the HAQ-DI. As this assessment instrument is based on questions evaluating difficulties in the performance of daily tasks, although not specific for obese people, we were not surprised by the finding that weight loss facilitated the performance of simple actions, such as dressing, bathing and drying; climbing into and out of vehicles and walking around their neighborhood. Obesity may negatively affect the performance of daily activities, as it is associated with more extensive sarcopenia with aging [34].

As already seen in our study, the MA QoLQLII is a quality of life assessment instrument specific for morbidly obese patients [12]. The items addressed in this questionnaire attempt to evaluate, in a comprehensive way, the quality of life of the morbidly obese, which can be compared to other clinical conditions with a major impact on health, such as: rheumatoid arthritis, cancer and spinal cord injuries [35]. The scores of the MA QoLQLII Questionnaire were significantly better at the end of the program, and the improvement was not correlated with the degree of weight loss.

The weight loss resulting from bariatric surgery helps reverse an unfavorable situation by improving the quality of life of the individuals who underwent the surgery, especially those subject to the so-called mixed or combined techniques (gastric bypass associated with gastroplasty) [36].

According to the World Health Organization, to achieve good health, humans should have balanced physical and mental states and interact with the society in a favorable manner [37]. In modern times, the limitations imposed by obesity divert the morbidly obese from achieving these states, so the search for weight loss solutions is justified. Generally, morbid obese patients have a long history of varied treatments often accompanied by a potential risk of complications [38]. The perspective of weight loss and the consequent health optimization have become real for these persons to the extent that a significant increase in the use of bariatric surgery has been observed in the treatment of morbid obesity [39].

However, even in developed countries this therapeutic option is not accessible to the majority of morbidly obese patients [40]. Additionally, a significant number of patients, despite formal indication for surgery do not wish to submit to the procedure or do not have the psychological or emotional state for it [7]. In Brazil, we are far from solving the problem of the long waiting lists in the hospitals authorized by the Unified Health System (SUS) to perform bariatric surgeries.

Results of clinical and laboratory analyses

The studied patients form a group characterized by a significant predominance of co-morbidities. Just under half (47.82%) had high blood pressure, though only one (4.34%) was diagnosed diabetic. However, all were on medications, as the control of their chronic diseases was a pre-condition for the safe practice of exercises. We find no alteration in the systolic or diastolic blood pressure when comparing the values at the start and end of the program. The use of medications and therapeutic adjustments for blood pressure control were not detailed in this study, mainly due to the fact that occasional changes in the doses were made, as required, in the assessment period, carried out before the clearance for participation in the study.

We noticed a decrease in the levels of total cholesterol and LDL cholesterol at the end of the study. The regular practice of physical activities might have a modulating effect on the serum levels of lipids by favoring the reduction of triglycerides, cholesterol and LDL cholesterol and may lead to an increase of HDL levels [41]. We found a trend to a correlation between weight loss and the improvement of lipid profile, and two weight-loss variables were significantly correlated with the decrease in LDL. Since the 1980s it has been known that, despite the beneficial effects on the blood levels of lipids, physical activities present better results when accompanied by weight loss [42]. Moreover, despite the effect of an eventual change in eating habits, which may have occurred in the group of studied patients, the addition of exercise is able to optimize the results of a diet program in therapeutic approaches of dyslipidemia, [43] and the results of our study suggest that this may also occur in morbidly obese patients.

Fibrinogen values were higher at the end of the program. There was no correlation between the changes observed in the values of fibrinogen values and weight loss. Fibrinogen level has been considered a risk marker for vascular diseases and is associated with sedentarism and excess weight [44]. The increased fibrinogen surprised us at first; however, several patients had the second blood sample collected a few days after a certain activity of the exercise program, and this may have affected the results, as an increase in fibrinogen level has previously been seen in the first few days following the practice of more vigorous physical activities [45].

Outlook

The sensation of well-being caused by the stimulation of group activities and also the expectation caused by the participation in studies of this nature can cause significant interference with the final analysis of the results [46]. However, we do not believe that the results of this study may be imputed only to the excitement arising out of the practice of group activities. The improvement in the 6MWT, especially leads us to believe that the regular practice of exercises could significantly contribute to an improvement in the mobility and quality of life of the group of morbidly obese studied by our team. Thus, our findings can serve as an incentive to develop other more in depth studies.

The program developed and adopted by our team could improve the life conditions of those awaiting the opportunity for a more effective treatment for their illness. The promotion of weight loss and the consequent improvement of the quality of life of the studied population justify the recommendation of implementing similar programs in the units providing assistance to morbidly obese patients. We believe that the adoption of healthier habits by patients preparing for bariatric surgery, in addition to the potential reduction in the risks associated with the procedure, could facilitate the maintenance of such habits in the postoperative stage. This become especially important, because the regular practice of exercises is considered an important contributor to weight loss in the long-term follow-up of this group of patients [47].

Acknowledgement

We thank Marcio Aurélio Pereira de Castro for laboratory analysis support, and Mauricio Gama, Bernardo Tura and Marco Aurelio Pereira for statistical analysis assistance.

Conflict of Interest

The authors of the article “Impact of an Exercise Program for Morbidly Obese Patients on Quality of Life and on Clinical and Metabolic Profile” have no conflicts of interest about this matter.

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