bmi journal seco-seedo

Revista de la Sociedad Española de Cirugía de Obesidad y Metabólica y de la Sociedad Española para el Estudio de la Obesidad

"Bariátrica & Metabólica Ibero-Americana"

Results of the implementation of a structured program of physical exercise in an obesity consultation.

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Abstract:

Although it is known as a health benefit, physical exercise is usually prescribed without a structured therapeutic program. In order to get a correct prescription, it's necessary to rely on a professional direction. We evaluate anthropometrically and with markers of cardiovascular strength and endurance, the results of the implementation of a physical exercise program in a specialized obesity clinic. 84 patients with obesity were recruited (BMI 32.9 ± 5.9 Kg / m^2), average age 50.8 ± 29.2 years. A prospective study of overweight or obese subjects who participated in a program of progressive exercise of hypertrophy and aerobic resistance combined for 6 months, the study of their body composition; power, coordination, muscle rhythm and measurement of cardiovascular resistance. The dietary plan was -500 Kcal / day. There were 47 dropouts during the first month (56%) and we obtained the final data of 23 (27.4%). We found a greater weight loss (5.2 kg), ($p < 0.05$), a loss of BMI (1.67 kg / m2), ($p < 0.05$) and a decrease in fat mass (4.65 kg), ($p < 0.05$); in the patients who completed the study, and also a significant intra subject improvement in power (W) ($p < 0.001$), rhythm ($p < 0.001$) and variation between repetitions ($p < 0.05$). No significant differences were found in cardiovascular resistance markers. A prescribed exercise program shows changes in body composition, with total weight loss, especially at the expense of the fatty compartment. There is a clear improvement in muscle performance (dynapenia). However, there is a high dropout rate.

Keywords:

- Physical exercise
- Potency
- Dynapenia

Introduction

The benefit of physical exercise in the obese or overweight patient is known in terms of weight loss, as an important complement to good nutritional and endocrinological control[1]. However, it often remains as a simple verbal recommendation, without a structured therapeutic program that treats each patient adapting to their individual characteristics and needs y, [2]. For its correct prescription it is necessary to know the body composition and measure the physical parameters of strength (power, coordination and muscle rhythm of both lower trunk and upper trunk) and cardiovascular resistance, to be able to prescribe a progression of muscular exercises aimed to reduce weight, through the fat percentage, without affecting the muscle mass negatively, by applying a nutritional plan, without an attached proper physical prescription.[3], [4] Otherwise, we could start with the loss of weigh and the loss of muscle mass[5].

Goals

To evaluate the markers of cardiovascular strength and endurance anthropometrically the results of the implementation of a physical exercise program in a specialized obesity clinic. In this way we will be able to observe the patient's evolution to a specific work methodology. Inaddition we will be able to study to the analysis of the body composition, the degree of dynapenia[6] (muscular dysfunctionality), sarcopenia[7],[8] (dysfunctionality due to loss of muscle mass) and cardiovascular resistance (aerobic exercise) through different muscle assessments.

Patients and methods

A prospective study with 84 overweight or obese patients (BMI 32.9 ± 5.9 Kg / m^2), 63% of whom were women, with an average age of 50.8 ± 29.2 years, participated in a program structured physical exercise for 6 months.

We began the study by taking measurements of the body composition through multipolar bioimpedance (InBody 230 ©); the power parameters, coordination and muscle rhythm in upper trunk (TS) and lower (TI) with the SmartCoach © muscle analyzer, performing a test for the lower trunk of 10 squats with Fitball resting on the wall, and for upper trunk , of 10 bench press repetitions with a bench at 30º and 6.1 kg bar. Both tests are performed at the highest possible speed of the patient (power). Finally, to measure the cardiovascular resistance, we use a Garmin Forerunner 430 © heart rate monitor and a Lifefitness C1 © ergometric bicycle. A sub maximum test of 5 minutes is performed, with pre-effort, average, maximum and post-effort heart rate control.

Once we know the patient's condition, we prescribed two exercise programs in two different phases, following the basic principles of sports progression. A first phase (Phase 1. Familiarization and anatomical adaptation) consisting of 3 sets of 15 repetitions with a 20 "pause between sets and between exercises, in horizontal progression, with a final

cardiovascular work of 20 minutes at 75% of the HR max. By bicycle, elliptical or walking, according to the patient's personal possibilities, when the patient passed this phase, the second phase began (Phase 2. Circuit work) which particularity was to maintain the type of exercises, changing their work structure and increasing the weight with which the exercises were executed. That is why the repetitions were reduced to 12. Additionally, the work was performed in a circuit (vertical progression) (figure 1).

We conducted a 45-minute face-to-face session in order to explain each of the phases, and the patient had to repeat the said session twice a week, at home. We compared the evolution of the final results with the initial results of the paired samples (t-student for paired samples) and we also compared the patients who completed the study with those who left prematurely. All patients followed the same conventional dietary plan (-500 Kcal / day), with monthly control on the part of a nutritionist.

Phase	I. Familiaritzation & AA	II. Circuit work
Nº Exercices	8	8 in circuit
Nº Series	3	3 in circuit
Nº Repetitions	15-20RM	12RM
Breack & Rests	Break 20"	Break 0" - Rest 60"
Cardiovascular work	20min 75%MHR	20min 75%MHR
Weekly frequency	2-3	2-3
Exercices	3 ex. UT	3 ex. UT
	3 ex. LT	3 ex. LT
	2 ex. Core	2 ex. Core
	Own weight	Own weight with load &/or free weight

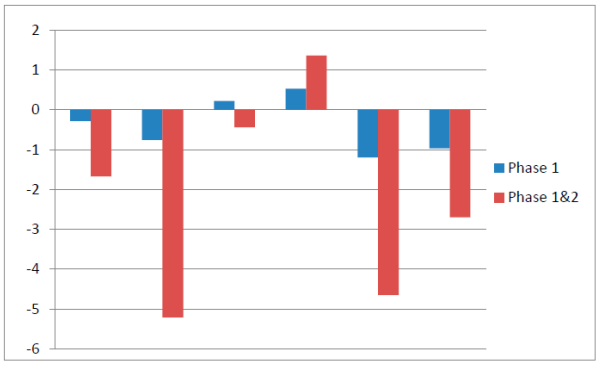
Figure 1: Program structure

Results

There were 47 dropouts during the first month (56%) and we obtained partial data from 14 subjects (16.6%) and final data from 23 (27.4%). The average follow-up was of 5 ± 1 months. In the patients who completed 6 months of training, we found a significantly greater weight loss of 5.2 kg ($p < 0.05$), a BMI loss of 1.67 kg / m2 ($p < 0.05$), and a decrease in fat mass of 4.65 kg ($p < 0.05$); compared to those who left prematurely, we found no significant differences in the gross muscle weight or percentage of muscle with respect to the total (Figure 2).

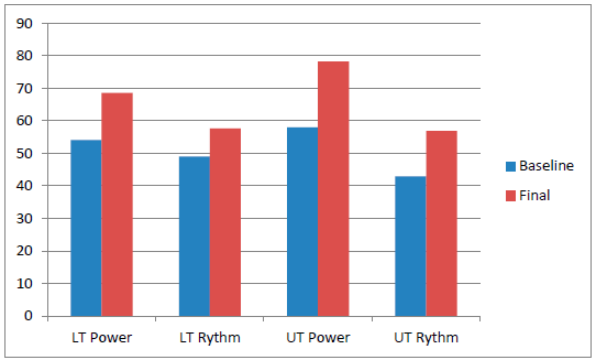
We also found a significant improvement in both the upper trunk and the lower trunk, in power (W) ($p < 0.001$) with increases of 25.9% (TS) and 21.2% (TI) respectively. The improvements found in the rhythm (repetitions / minute) ($p < 0.001$) were 24.6% (TS) and 14.9% (TI) (figure 3), and the variation between repetitions (differential range between more and less power repetition, in W) ($p < 0.05$) was reduced by 22.4% (TS) and 45.6% (TI) (figure 4.

On the other hand, no significant differences were found in the 4 parameters studied of cardiovascular resistance (pre-effort, maximum, average, and post-effort HR) (Figure 5), or correlations between parameters of different types.



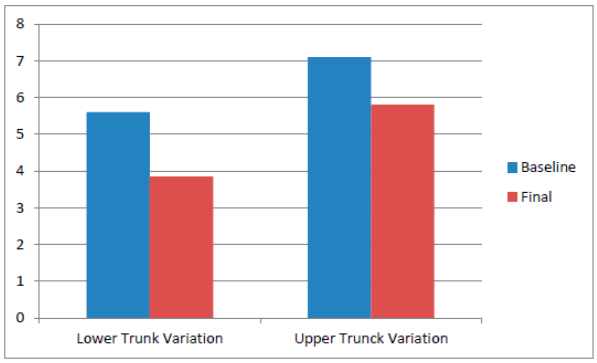
Body Composition		
	Phase 1	Phase 1&2
BMI (kg/m^2)	-0,28	-1,6696
Total Weight (kg)	-0,76	-5,21
Muscle Mass (kg)	0,22	-0,44
%muscle (%)	0,53	1,36
Fat Mass (kg)	-1,2	-4,65
%Fat (%)	-0,97	-2,7

Figure 2: Evolution of body composition (Body mass index, Total weight (kg), Muscle weight (Kg), Muscle percentage (%), Fat weight (Kg) and Fat percentage (%)) in which patients completed the training program (green) versus those who left prematurely (red). (p> 0.05).*



Muscle Power		
	Baseline	Final
LT Power	54,05	69
LT Rythm	49,062	57,658
UT Power	58	78,243
UT Rythm	42,9	56,9

Figure 3: Intrasubject evolution of power and muscle rhythm.



Variation		
	Baseline	Final
Lower Trunk Variation	5,6	3,846
Upper Trunck Variation	7,1	5,8

Figure 4: Intrasubject evolution of the variation between repetitions.

		t test for equality of means		
		gl	Sig. (bilateral)	Mean Differences
Dif. FC PRE	Equal variances are assumed	35	0,935	0,450
	Equal variances are not assumed	33,153	0,923	0,450
Dif. FC MEDIA	Equal variances are assumed	35	0,892	0,820
	Equal variances are not assumed	31,363	0,871	0,820
Dif. FC MAX TEST	Equal variances are assumed	35	0,837	1,413
	Equal variances are not assumed	32,431	0,807	1,413
Dif. FC POST	Equal variances are assumed	35	0,842	-3,658
	Equal variances are not assumed	31,367	0,835	-3,658

Figure 5: Dispersion of cardiovascular data

Discussion

We have been able to observe how a prescribed physical exercise program taught by a professional in physical activity and health, does not improve the dropout rates described in the bibliography [7], [8], being the dropouts of 56% of our patients, one of our main problems to be treated in the future. This lack of compromise with the exercise, on the part of more than half of all the members of the study, clearly suggests the need for a greater patient control by the professional, including many more group or individual sessions with a qualified instructor, at least in the first 6 months, to ensure the correct progression and learning of the exercises[9].

However, patients who have successfully completed the program, with a compromise of more than 80% of the prescribed sessions, have achieved significant improvements in body composition, promoting the desired weight loss, at the expense of the fatty compartment[3]. However, we have not observed an increase in muscle mass, including some loss in absolute values[3]. We might think that the exercises have not been sufficiently anaerobic in intensity or in the progression we established, it is true that, despite the lack of muscle gain, there has been an improvement in the parameters of power and dynapenia, concluding that, although there is the same muscle- or somewhat less -, this is more effective[9], and, although this study is not statistically significant, the percentage of muscle mass of the patient has increased[10]. We can even predict that the relationship and coordination between muscle fibers in regard to an already known (trained) exercise has improved. This can be observed in the relationship between repetitions during the test, where the first time it is performed, there is a high variation between the repetitions, and this decreases significantly in subsequent tests, showing a clear improvement of the muscle to exercise[9].

With regard to the improvements in cardiovascular resistance parameters, we have not gotten statistically significant differences. Perhaps the chosen tests and their lintel (submaximal) were not adequate, since they are designed for sedentary people. Having a certain level of physical activity (healthy household habits, "I have been walking or running," "I am not feeling well today ...") the said test did not involve a stress high enough for the body, producing a large dispersion of data heart rate (baseline, maximum, rest and post-exercise), and not being able to draw significant conclusions[11], beyond the important benefits already known, that is, that the prescribed cardiovascular work and performed regularly, has to prevent cardiovascular diseases and reduce the risk of mortality[11] , [12].

Conclusions

A prescribed physical exercise program taught by a professional in physical activity and health, presents improvements in body composition, promoting the desired weight loss, at the expense of the fatty compartment, and very significantly improves the muscle performance (dynapenia), both in potency as in rhythm and variation between repetitions, provided that the patient meets the pre-established compromising requirements. However, the high rate of existing dropouts should be taken into account.

Conflict of interests

The author declares no conflicts of interest.

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