Silva and Grande., J Obes Weight Loss Ther 2013, 3:5
DOI: 10.4172/2165-7904.1000185

Obesity & Weight Loss Therapy

Research Article Open Access

Weight Loss Management through Exercise Based on Guideline Recommendation: A Case Series from SRF-YMCA Study

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Abstract

In order to preserve and improve the health status of individuals, we proposed the study project SRF-YMCA (Surveillance of Risk Factors for chronic diseases in YMCA members). Thus, the objective of this study was to analyze the weight loss management through exercise based on ACSM/AHA guideline recommendation. We randomly evaluated 30 subjects (15 men and 15 women, aged between 26 and 48 years) from SFR-YMCA, performing a case series study. The exercise prescription was based on the ACSM/AHA current recommendations for health-related to physical activity. The outcomes studied were: total body mass (kg), body mass index (kg/m²), waist-to-hip ratio, waist circumference (cm), sum of peripheral skinfolds (mm), and sum of central skinfolds (mm), body fat percentage (%), total fatness (kg) and lean mass (kg). The reassessment was conducted at six months after the beginning of exercise. To examine the responsiveness to the exercise, we estimated absolute and relative deltas values. For the statistical analysis, we used the Shapiro-Wilk test, Student t test, Wilcoxon test and Mann-Whitney U Test ($p \leq 0.05$). The exercise based on the ACSM/AHA guideline recommendation for weight loss management was effective. Significant changes and tendencies to improvements occurred in components of body composition (e.g. fat reduction, lean mass increase) for both genders. In addition, it was found that men generally have better responsiveness than women do.

Keywords: Weight loss management; Physical activity; Fat reduction; Exercise

Introduction

The prevalence of obesity has increased in the last century and was dramatically accentuated in recent decades. The Obesity Society [1] conceptually defined obesity as the excessive accumulation of body fat, the total body fat, fat deposit or even based on morphology of adipocytes. An operational definition of obesity, useful in many contexts, is BMI ≥ 30.0 kg/m², but it should not be used as a conceptual definition. The obesity denotes excess body fat in a large amount, enough to cause a reduction in health or longevity. This health impairment will not be visible in all cases according to the operational definition used, but the risks caused by obesity impair future health. Etymologically [2], obesity can be defined as a chronic imbalance between food intake and energy expenditure, which is associated with chronic non-communicable diseases (NCDs). In addition, obesity is classified as a disease (ICD: E65-E68) [3].

Preventive measures can be adopted to avoid the increase of NCDs, including obesity, in the population. One of the Strategies is the regular practice and adequate level of physical activity [2,4]. According to estimative by the World Health Organization [4], about 2 million people die prematurely worldwide every year due to sedentary behavior, generating unnecessary expenses. Physical activity health promotion programs, such as the *Agita São Paulo* [5] were able to save $ 310 million per year.

Considering these facts, the American College of Sports Medicine, along with the American Hearth Association (ACSM/AHA) [6], recommended that physical activity focusing on health should include aerobic, resistance and flexibility exercises.

In order to maintain and enhance the health status of individual, we proposed the study project SRF-YMCA [7] (Surveillance of Risk Factors for chronic diseases in YMCA members). Thus, the data of this case series study are part of SRF-YMCA and the objective was to analyze the weight loss management through exercise based on ACSM/AHA guideline recommendation in women and men.

Materials and methods

Sample

For the elaboration of this study, we used the information contained in the database of the Laboratory Prof. José Carlos de Almeida of YMCA Sorocaba, Brazil. We randomly evaluated 30 subjects (15 men and 15 women, aged between 26 and 48 years) from SRF-YMCA [7], performing a case series study.

Intervention

The inclusion criterion for the study was: be physically active before the start of the study, however, they could not meet the current physical activity recommendations. Thus, adjustments were made in training, based on the current ACSM/AHA [6] recommendations for physical activity aiming health. Furthermore, they should have remained active in the physical activity level prescribed for a period of six months. Thus, the moderate-intensity aerobic exercises should be performed in sessions of at least 30 minutes, 5 days/week or vigorous intensity for at least 20 minutes, 3 days/week. Resistance exercises (strength and/or resistance) should be performed on at least 2 days/week.

Outcomes

To the analysis of body composition the outcomes studied, were: total body mass (weight) (kg); body mass index (BMI) (kg/m²) for analysis of overweight; waist-to-hip ratio (WHR) for the analysis of standard fat distribution; waist circumference (WC) (cm) to analyze abdominal obesity; peripheral skinfolds sum (ΣPSS) (mm) for analysis

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Received July 23, 2013; **Accepted** August 19, 2013; **Published** August 21, 2013

Citation: Silva V, Grande AJ (2013) Weight Loss Management through Exercise Based on Guideline Recommendation: A Case Series from SRF-YMCA Study. J Obes Weight Loss Ther 3: 185.doi:10.4172/2165-7904.1000185

of the content of fat in members; central skinfolds sum (ΣCSS) (mm) for analysis of the trunk fat change; body fat percentage (%F) (%) to analysis the fat proportion in the body; total fat (TF) (kg) for analysis the total fat in the body; lean mass (LM) (kg) for analysis the musculoskeletal development and residual effects. The reassessment occurred six months after the beginning of training.

We analyzed the training responsiveness comparing women and men. It was made by calculating absolutes deltas (Δ_a) and relative ($\Delta_{\%}$), through the equations presented below

$$\Delta_a = (\text{post-training}' - \text{'baseline'})$$

$$\Delta_{\%} = \left[\frac{\Delta_a}{\text{'baseline'}}\right] \times 100$$

Statistical analysis

We compared baseline and post-training outcomes using "t" test for paired samples if data distribution were normal according to Shapiro-Wilk test. For variables that were not normal, the Wilcoxon test was used.

We applied mean difference to compare training responsiveness (Δ_a and $\Delta_{\%}$) comparing women and men. The "t" test for independent sample was used if data distribution was normal according to Shapiro-Wilk test. For variables that were not normal, the Mann-Whitney U Test was used.

Results are presented as means and standard deviations. We used $p \leq 0.05$ for hypotheses tests.

Results

Changes in body composition after six months of exercise based on ACSM/AHA guideline recommendation are presented in table 1. In women, the differences were found between baseline and post-training only in ΣPSS and LM, with a tendency to improve the other outcomes. For men, differences were found between baseline and post-training for WHR, ΣPSS, ΣCSS, %F, TF and LM, existing tendency to improve the other outcomes.

A comparison of the body composition responsiveness to training is presented in figure 1. When we compared the responsiveness to training through Δ_a, the differences were not statistically significant between men and women. However, there were tendency to great changes in men. When we compared the responsiveness to training in terms of $\Delta_{\%}$, there were significant differences between men and women in follow outcomes ΣPSS, ΣCSS, %F and TF, with the highest changes in men. Even for the outcomes that showed no significant differences the greatest changes were found in men, except for LM where woman shows a great non-significant mean difference.

Discussion

The human evolution has occurred in 2.4 million years of our existence (Homo habilis), which maintained a high level of physical activity [8,9]. However, with the industrial revolution (~1700) the physical activity levels were drastically reduced. This means that 99.99% of the history of human physical activity level was high and it has contributed to the development of our genetic code (we adapted to regularly physical activity) [10,11]. However, our sedentary culture, recently acquired, has high rates of morbidity and mortality due to chronic non-communicable diseases [12].

For maintenance and/or improvements in body composition components at any level (atomic, molecular, cellular, tissue or whole body) [13], physical activity is a key factor for successful of body weight management and tit is directly related to the health [14-16]. As shown in the results of this study, physical activity was able to improve the components of body composition in men and women. Outcomes like total body mass (weight) and BMI did not change significantly. It could be because of the subjects of this study modified proportionally body fat and lean mass. It is important to highlight that BMI does not distinguish between being overweight due to lean mass or due to fat accumulation [17].

The current ACSM/AHA [6] physical activity recommendations explore the need for maintain and improve health status of the population, allowing, thus, the struggle against morbimortality. We found that in this particular level of training the individuals respond similarly at six months after the beginning moderate-intensity aerobic exercises performed in sessions of at least 30 minutes at 5 days/week or vigorous intensity for at least 20 minutes at 3 days/week, plus resistance exercises (strength and/or resistance) performed on at least 2 days/week.

When comparing men and women through absolute deltas, we did not find statistically significant differences, although there was

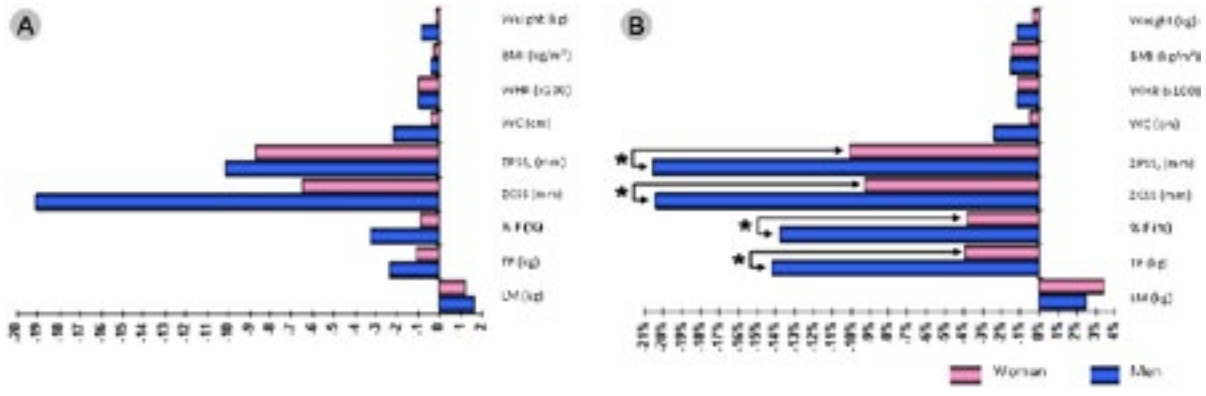

Figure 1: Absolute and relative deltas of body composition responsiveness after exercise based on guideline recommendation.

* Significant mean difference of responsiveness between genders ($p \leq 0.05$); results presented through mean values; part 'A' of the figure shows the absolute changes (Δ_a) in body composition; part 'B' of the figure shows the relative change ($\Delta_{\%}$) of body composition.

	Women		Men	
	Baseline	**Post-Training**	**Baseline**	**Post-Training**
Weight (kg)	59.71 ± 13.10	58.67 ± 11.80	77.20 ± 14.30	76.25 ± 12.23
BMI (kg/m²)	24.26 ± 4.48	23.72 ± 3.94	25.93 ± 3.51	25.43 ± 2.94
WHR	0.80 ± 0.07	0.79 ± 0.05	0.88 ± 0.07	0.86 ± 0.07*
WC (cm)	78.95 ± 12.03	77.03 ± 9.82	87.59 ± 11.27	85.85 ± 10.20
ΣPSS (mm)	81.81 ± 25.94	70.53 ± 24.73*	46.23 ± 15.54	35.44 ± 11.06*
ΣCSS (mm)	93.75 ± 39.16	79.65 ± 34.60	78.86 ± 37.02	62.02 ± 30.51*
%F (%)	33.05 ± 10.36	29.85 ± 10.15	20.04 ± 7.50	16.83 ± 7.56*
TF (kg)	20.89 ± 11.47	18.48 ± 10.67	16.18 ± 8.26	13.38 ± 7.60*
LM (kg)	38.81 ± 2.77	40.18 ± 3.44*	61.02 ± 8.25	62.87 ± 7.89*

* Difference between baseline and post-training ($p \leq 0.05$); † ACSM/AHA guideline recommendation for physical activity [6].

Table 1: Changes in body composition through exercise based on guideline recommendation†.

a tendency to increase the benefits in men. However, when doing these comparisons using relative deltas, we found that men respond significantly better in ΣCSS, ΣPSS, %F and TF outcomes, with a tendency to increase results in men, except for lean mass, i.e., women showed the better response in relative terms in this aspect.

These comparisons are similar with a recent systematic review published in this journal [18] that aimed to review existing literature comparing gender differences in weight loss and weight loss maintenance. Despites the majority of the 12 studies on weight loss maintenance reported no gender differences, meta-analysis revealed higher relative weight loss in men compared to women. In addition, weight loss treatment outcome appears to be in great for men. These differences appear to be beginning in puberty [19].

One of most important outcome of this study related to morbimortality risk [17,20] was central fat analyzed by waist-to-hip ratio, waist circumference and central skinfolds sum. Although just men showed significant differences for waist-to-hip ratio and central skinfolds sum, all groups tended to improve the outcomes. For the absolute and relative deltas of body composition responsiveness after exercise based on guideline recommendation, there are difference between women and men just in central skinfolds sum. Although the weight loss management appears to be in great for men.

Conclusion

The exercise based on the ACSM/AHA guideline recommendation for weight loss management was effective in this case series study. Significant changes and tendencies to improvements occurred in components of body composition (e.g. fat reduction, lean mass increase) for both genders. The components which did not change significantly showed a tendency for improving.

In addition, it was found that men generally have better responsiveness than women. However, the differences were not significant in absolute values. Only in relative terms there were differences in training responses between genders.

Author's Contribution

Valter Silva and Antonio José Grande participated in the conception and design, analysis and interpretation of data, drafting the article and revising it critically for important intellectual content and final approval of the version to be published.

Conflict of Interest

There are no financial or non-financial competing interests (political, personal, religious, ideological, academic, intellectual, commercial or any other) related to this manuscript.

Acknowledgement

For award of the scholarship, the authors are grateful to CAPES (Coordination for the Improvement of Higher Education Personnel).

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