Effect of Different Methods of Training in Body Composition and Lipid Profile in Occupational Men

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Abstract

Obesity is increasingly present in the population and raises the risk of death from cardiovascular diseases. The objective of this study was to investigate changes in body composition, total cholesterol, LDL, HDL and triglycerides of obese adults. The sample was composed of twelve male volunteers subjected to dual energy X-ray absorptiometry analysis with body composition (DEXA) and examinations that included plasma concentrations of total cholesterol, LDL, HDL and triglycerides in the blood. The volunteers were inserted into three training models: Aerobic Training (AeT), Anaerobic Training (AnT) and Concurrent Training (CT). The training period was twelve weeks, with three sessions per week lasting 60 minutes. The AeT group took part in running sessions with cycling sessions. The AnT group performed bodybuilding exercises. The CT group combined the two previous models, with no gap between them. All variables were tested for normality of distribution by the Shapiro–Wilk test. For those who presented normality, the paired sample test was used for comparison before and after training (mean ± standard error). All analyses were performed by the Statistical Package for the Social Sciences (SPSS) version 21.0. A significance level of α = 0.05 was used. When comparing the initial and final periods of intervention was observed reductions in variables: total weight, body fat weight and visceral fat weight in all groups. Total cholesterol decreased only in the CT group. Already, the LDL cholesterol decreased in the AnT and CT groups, being that in the CT with greater notoriety. HDL cholesterol increased in all groups, and in the AnT with greater notoriety. The plasma triglyceride concentration decreased only in the AeT and CT groups. The data suggest that the concurrent training is effective for the reduction of obesity when compared to the aerobic and anaerobic methods.

Keywords: Methods of training; body composition; lipid profile

Introduction

Obesity characterized by excess fat present in an individual may be accompanied by glucose intolerance, insulin resistance, dyslipidemias, hypertension, increased visceral adipose tissue and increased risk of coronary heart disease and cancer [1]. Obesity and overweight kill around 2.8 million people per year, mainly in developed countries [2]. In Brazil, about 40% of the population has an inadequate body fat index for the age group, and when adiposity is distributed in the waist region, they increase the chances of metabolic disorders associated with cardiovascular disease [3]. Currently the fight against obesity is carried out through dietary, drug and surgical manipulation, since the causes that have greater association with overweight and obesity are according to the metabolism. In this way multidisciplinary teams composed by doctors, psychologists and nutritionists were created, however these strategies seem not to be enough to reduce the obesity indices. Therefore, the objective of the present study was to verify the effect of different training methods on body composition and lipid profile of obese men.

Methodology

The research is pre-experimental in nature. This research model consists of the application of experiments with non-randomly formed sample groups, which are performed with the purpose of controlling the action of possible intervening factors and investigating degrees of change resulting from specific interventions in the dependent variables. All participants read and signed the informed consent form (TCLE). The sample was selected for non-random convenience.

The following inclusion criteria were established:

a) Not to perform regular physical activity in addition to the training prescribed during the study;
b) Have no limitations or injuries that could interfere with training; and
c) Do not control food or ingest substances that could influence the interpretation of results. The study was conducted in accordance with the Helsinki Declaration and the International Committee of Medical Journal Editors [4].

Subjects

Table 1: Characteristics of the participants presented in mean±sd.

<table>
<thead>
<tr>
<th>Group</th>
<th>Body mass (kg)</th>
<th>Age (years)</th>
<th>Height (cm)</th>
<th>BMI</th>
</tr>
</thead>
<tbody>
<tr>
<td>AnT</td>
<td>83.21</td>
<td>32.50</td>
<td>1.70</td>
<td>28.8</td>
</tr>
<tr>
<td>CT</td>
<td>108.43</td>
<td>29.55</td>
<td>1.80</td>
<td>33.4</td>
</tr>
<tr>
<td>AeT</td>
<td>84.76</td>
<td>29.50</td>
<td>1.66</td>
<td>30.8</td>
</tr>
<tr>
<td>Mean±sd</td>
<td>92.1±14.11</td>
<td>30±1.76</td>
<td>1.72±0.1</td>
<td>31.0±2.3</td>
</tr>
</tbody>
</table>

AnT: Anaerobic Training; CT: Concurrent Training; AeT: Aerobic Training; BMI: Body Mass Index

Table 2: Anthropometric parameters of individuals before and after training.

<table>
<thead>
<tr>
<th>Parameters Anthropometric</th>
<th>AnT</th>
<th>AeT</th>
<th>CT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
<td>P</td>
</tr>
<tr>
<td>Body Weight (kg)</td>
<td>83.23 ± 4.64</td>
<td>82.96 ± 4.30</td>
<td>0.013</td>
</tr>
<tr>
<td>BF (%)</td>
<td>31.41 ± 0.98</td>
<td>30.72 ± 1.39</td>
<td>0.062</td>
</tr>
<tr>
<td>LLM (kg)</td>
<td>55.21 ± 3.68</td>
<td>55.55 ± 4.27</td>
<td>0.541</td>
</tr>
<tr>
<td>FM (Kg)</td>
<td>25.22 ± 2.55</td>
<td>24.65 ± 2.68</td>
<td>0.077</td>
</tr>
<tr>
<td>MM (kg)</td>
<td>66.49 ± 3.15</td>
<td>67.70 ± 2.79</td>
<td>0.074</td>
</tr>
<tr>
<td>VF (kg)</td>
<td>1.11 ± 2.01</td>
<td>1.08 ± 1.80</td>
<td>0.007</td>
</tr>
</tbody>
</table>

Twelve male volunteers (41.51 ± 10.98 years, 72.03 ± 12.94 kg, 171.94 ± 10.33 cm), active and overweight or obese were included in the analysis performed by the index of body mass (BMI) (Table 1). The sample was randomly divided into four groups: anaerobic training (N = 04), aerobic training (N = 04) and concurrent training (N = 04). These volunteers underwent a lipid profile analysis through laboratory tests, which identified the levels of total cholesterol (TC), HDL, LDL and triglycerides (TG). Besides the lean body mass, fat mass, muscle mass and visceral (Table 2).

Procedures

The lipid profile and body composition evaluations were performed pre-training program and after 90 days of training. In the evaluation, participants were submitted to the following blood tests: total cholesterol; HDL; triglyceride; Cholesterol test; LDL. The X-ray absorptiometry technique was used to evaluate the body composition using the Lunar IDXA device from GE Healthcare.

Physical training protocols

Participants were familiarized with the procedures for two sessions prior to initiating the intervention.

AnT group: Comprised of a running session or a session of cikism, three times a week with a load corresponding to 7 on the BORG Scale, with a 2:1 ratio (2 minutes of running and 1 minute of recovery), recovery corresponded to a load 3 in the BORG Scale.

AnT group: Composed by squatting on the bar; horizontal supine; armrest; leg press; pulled high; seated paddling; I sink with free weight; cross over; pullover; triceps forehead; threading biceps and development, all of them divided into 3 weekly sessions. The volunteer performed 3 sets of 8 to 12 maximal repetitions per exercise, with a load corresponding to 7 of the BORG Scale and a recovery of 1 minute.

CT group: Composed by the combination of the two physical training models previously mentioned. In this training model different energy sources are requested, being one predominantly aerobic (running) and one with neuromuscular anaerobic predominance (resistance exercise). In the three training sessions, resisted exercises and walking / running were performed, both in the same training session, with no interval from one to the other.
Statistical analysis

All variables were tested for normality of distribution by the Shapiro-Wilk test. For those who presented normality, the paired teste was used for comparison before and after training (mean ± standard error). All analyzes were performed by the Statistical Package for the Social Sciences (SPSS) version 21.0. A significance level of α = 0.05 was used.

Results

This study verified the effect of different training methods on overweight or obese men. There was a reduction in the variables total weight, body fat weight and visceral fat weight in all groups. There was a reduction in total cholesterol only in the CT group.

Table 3: Pre and Post-program training results in the TC, HDL, LDL and TG of the study participants in mean±sd.

<table>
<thead>
<tr>
<th>Group</th>
<th>Pre TC (mg/dl)</th>
<th>Post TC (mg/dl)</th>
<th>Pre HDL (mg/dl)</th>
<th>Post HDL (mg/dl)</th>
<th>Pre LDL (mg/dl)</th>
<th>Post LDL (mg/dl)</th>
<th>Pre TG (mg/dl)</th>
<th>Post TG (mg/dl)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AnT</td>
<td>197</td>
<td>208</td>
<td>50</td>
<td>56</td>
<td>118,8</td>
<td>118,6</td>
<td>141</td>
<td>167</td>
</tr>
<tr>
<td>CT</td>
<td>169</td>
<td>145</td>
<td>43</td>
<td>42</td>
<td>110,8</td>
<td>88,4</td>
<td>76</td>
<td>73</td>
</tr>
<tr>
<td>AeT</td>
<td>125</td>
<td>145</td>
<td>33</td>
<td>37</td>
<td>61</td>
<td>80</td>
<td>154</td>
<td>142</td>
</tr>
<tr>
<td>Médias p</td>
<td>163±36,31</td>
<td>166±36,37</td>
<td>42±8,54</td>
<td>45±9,85</td>
<td>96,87±31,32</td>
<td>95,67±20,30</td>
<td>123,67±14,79</td>
<td>127,33±48,69</td>
</tr>
</tbody>
</table>

TC: Total Cholesterol; TG: Triglyceride; HDL: High Density Lipoproteins; LDL: Low Density Lipoproteins; mg/dl: milligrams/deciliter.

Discussion

This study investigated the effect of different training methods on body composition and lipid profile with overweight and obesity men. There is an increase in HDL and CT in the AnT group and reduction of LDL. Corroborating with the researches of [5]; The high levels of HDL exhibit a relation of lower risk of heart disease even compared to subjects with CT below the borderline, leaving it to be understood that the effect of the applied AnT may have positively influenced the participant’s lipid profile. However, TG levels increased considerably, but it should be noted that no diet was applied during the twelve weeks of intervention in any of the groups and this may have a direct influence on this increase. In the CT group there was a reduction in CT, HDL, LDL and TG after intervention. In the AT group there was a reduction in TG and an increase in HDL, corroborating with the literature that indicates greater emphasis on aerobic exercise to reduce plasma triglyceride levels and increase HDL levels [6]. Other differences were observed between the groups in the comparative analysis regarding MC, MM and MG before and after the training program. The CT and AeT groups reduced MC and MG, but a larger reduction was observed in the CT group when compared to the TA group.

The problem of obesity and overweight is related to the evolution, or regression, of current lifestyles in modern societies. In fact, there was a technological evolution, which made our daily tasks easier. But there was also a drastic reduction in the amount and quality of daily physical activity. The causes that lead or predispose to overweight and obesity are according to behavioral influences the quality and quantity of physical activity, quality and quantity of nutrition, being smoker and socioeconomic conditions. According to the metabolism namely the genetic, metabolic and endocrine factors, besides race, gender, age, and gestational state.

Namely, the components of daily energy expenditure, the resting metabolic rate which is the energy needed to maintain our vital functions, and accounts for about 50 to 70% of daily energy expenditure. The digestion of food that corresponds to 10% of the daily energy expenditure. And the physical activity that is the component that we can change effectively and can change the other two in a favorable or unfavorable way. Regarding the resting metabolic rate, the amount of muscle mass is an aspect that influences it by increasing it. Particularly if muscle mass predominantly has type II muscle fibers. In fact, it is not muscle mass that has an energy expenditure / kg of mass higher. Organs like brain, heart, liver and kidneys possess more, yet the muscle mass of the human body is larger than these organs. Thus, in a woman weighing 55 kg and 21-25% fat and a man weighing 75 kg and 15-19% fat, it is possible to observe that the contribution to the value of the metabolic rate of daily rest by the organs is at most about 709 kcal / day. In turn, fat contributes about 64.1 kcal / day and muscle with about 226.2 kcal / day in women and 331.5 kcal / day in man.

Regarding the type of exercise and the energy cost, predominantly aerobic exercises seem to have a higher cost compared to strength exercises. In fact, predominantly aerobic exercises require a greater amount of muscle mass in general, while strength exercises are more localized. However, the intensity of the exercise is that it plays a key role. Strength exercises involving large muscle masses and
with a high intensity around 70% of 1RM can present high energy cost per minute values and are equivalent to aerobic training. The problem is in the methodologies used to calculate the energy cost in the physical exercise. The most widely used and viable method is the quantification of $\text{VO}_2$ and the production of $\text{CO}_2$ (carbon dioxide), although this method is valid to quantify the energy cost in predominantly continuous aerobic exercises where there is a stabilization of $\text{O}_2$ consumption, it does not have this capacity in high intensity and intermittent efforts, such as strength, where the predominant energy is lactic anaerobic. In this way, we cannot establish a direct relationship between $\text{O}_2$ consumption and energy cost. In fact, there is no valid method to measure the energy cost via the lactic anaerobic route, perhaps because of this lower energy cost values are presented in the strength exercises.

Fernandez et al. [7] conducted a study to evaluate the effect of anaerobic physical exercise on body fat mass with obese adolescents compared with aerobic exercise. The finding did not present significant differences between the groups, but a decrease in the body mass index, when compared to the initial and final values of the training in each individual. This finding corroborates the fact that even without a restrictive diet, physical exercise is capable of promoting a significant mass loss in biological terms. The process of choosing the most appropriate training protocol is extremely important for the goal to be achieved. The proposed training programs activate different metabolisms of energy generation, the aerobic metabolism of moderate intensity, is the one used to reduce the corporal grading. In fact, the biochemical adaptations induced by continuous exercise have been studied since the late 1960’s and it has been definitively proven that this type of activity induces an increase in the oxidative capacity of the muscle, by the increase in the activity of key enzymes of beta-oxidation, a specific metabolic pathway for the oxidation of fatty acids, and also to signal and increase the speed of other metabolic pathways of the oxidative metabolism of ATP (Adenosine Triphosphate) resynthesize, such as the Krebs cycle and the mitochondrial respiratory chain [8]. However, the effects of high intensity anaerobic exercises, especially those using resisted exercise, are still poorly understood. Therefore, [2] recommends the maintenance of lean mass as an integral part of a physical exercise program, which reduces the risk of developing diseases, such as disturbances in lipid metabolism, fat levels found in the blood circulation, and in the concentrations of its components such as total cholesterol, HDL cholesterol, LDL cholesterol and triglycerides are directly associated with the influence of diesta on the analyzed parameters. New studies should be conducted considering a control group and the improvement of its components such as total cholesterol, HDL cholesterol, LDL cholesterol and triglycerides are directly associated with the influence of diesta on the analyzed parameters.

Conclusion

Based on the objectives and results presented, it is verified that the concurrent training is effective for the reduction of obesity when compared to the aerobic and anaerobic methods.

References


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