Comparison between the callisthenic gymnastic training effects and weight lifting training on endurance levels of non athletic women

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Abstract: The training with weights or the training with mass became one of the most known exercise both the athletes’ performance and improved the no athletes’ physical conditions. The aim of this study is to compare the effects of the localized (callisthenic) gymnastic training (LGT) and weight lifting (WT) on no athletes women. There were 48 women assessed – 25 of them practiced localized gymnastic training (LGT) and 23 practiced weight lifting (WT), within age bracket from 20 to 37 years old. The volunteers should have been practicing their activities since six months before and they could not practice the two activities simultaneously. All of them were submitted for the Push-up Test and abdominal flexion Test according to Pollock’s; Wilmore’s protocol (1993). Through Mann-Whitney’s test there was a statistically significant difference, $\alpha = 5\%$ to the variant Push-up. Then results were coherent with the expectations, because the Push-up is a basic exercise to LG. So, there is an index that LG may present a differentiated impact from weight lifting training to convergent variables with the specificity of the modality.

Keywords: callisthenic gymnastic, weight lifting, muscular endurance.
INTRODUCTION

The human movement is each day one element to be valued in the culture as a vital factor in the prevention of organic unbalances in a world where the rigidity is valued, acting as a tool for achieving health and welfare, combating the effects of stress in life modern and its pathological effects in the body (FERNANDES CHILD, 2003).

Starting in 1968, linking the benefits of the training of certain components of fitness with health and / or prevention of hipocinesy diseases was sought, arising from the sedentary life and little exercise. When relating fitness as one of the components of health, it is understood that a healthy person has physical qualities with rates that will allow it to the performance of its basic tasks of daily life, whether at work or at leisure. In this perspective, physical fitness related to health is the ability to perform daily activities with the force so that there is less risk of chronic-degenerative diseases. Its components are related to mobility skills conditional, cardiorespiratory endurance, muscular strength and located endurance, flexibility and body composition, and other psychosocial functions (BÖHME, 2003; FERNANDES CHILD, 2003; GUEDES & GUEDES, 1995; NIEMAN, 1999).

Romero et al. (2003) state that one of the most important functions of the practice of activity in the academy lies in the perception of a new world, and this helps in the construction of new habits of life and new values. Adding to this the improvement of health, where the disease caused by lack of movement of the human being cause physical and psychological disorders. This way, people seek gyms in a liberal way, which will make the practice of oriented physical activities, with pleasure, with an aesthetic objective (fitness), and improved levels of life quality (wellness) (NOVAES, 2001).

Among the methods of neuromuscular conditioning used in gym academies are the localized workout and bodybuilding. Novaes & Vianna (2003) reported that the localized workout had its origin in Rio de Janeiro in 1930. After suffering influences from different foreign methods, it is structuring its methodological identity and fixing itself as a Brazilian gymnastics method. The goals of a class localized workout seek the development of the cardiopulmonary system, the performance of the major localized muscle groups and physical qualities such as strength, localized muscular endurance, anaerobic and aerobic endurance, flexibility, coordination, balance, discontraction. The effectiveness of a program of localized workout reflects an improvement of aesthetic body, with weight loss and increased muscle tone, improve the physical fitness and quality of life (NOVAES Santos et al., 2002).

Bodybuilding, the oldest form of training used by man, is defined as a physical activity developed by analytical exercises. Use progressive resistance provided by weights, bars, rings, clusters, modules, extensors, etc. It is mainly dedicated to the development of explosive strength, dynamic strength and muscular localized endurance (DANTAS, 2003). It has several purposes of which are: the aesthetics, therapy, prophylactic, the physical preparation, the competitive and the special (NOVAES & VIANNA, 2003).
Due to the lack of studies related to the comparison of the levels of improvement in physical valences between the two types of training previously mentioned, it appears the need for research to check on the effects of these methods of physical activity.

**OBJECTIVE**

The purpose of this study was to compare the effects of training of localized workout in the levels of localized muscle resistance (RML), on non-athlete women.

**METHODOLOGY**

**Sample**

The sample was formed by 48 women, non athletes, and 25 practitioners of localized workout (GL) and 23 practitioners of bodybuilding (GM), students from three academies of Grande Rio. The individuals should all be registered in the academy for at least six months and could not practice the two types of training during the experimental treatment.

**Instrumentation and Protocols**

For this study, a digital scale (Filizola, Brazil) with accuracy of 100g and scale of 0 to 150kg was used, to assess the body mass, and an adipometer (Sanny, Brazil) to measure the G%, and a stopwatch (Casio, Brazil) to mark time on the FLAB test. The protocols were used to test flexion of Arms and abdominal flexions (POLLOCK & WILMORE, 1993), and to measure the percentage of fat, Protocol, 7 DC was used, & Jackson Pollock (1978).

**Statistical Treatment**

The treatment was composed of statistical descriptive analysis (COSTA NETO, 1995), aiming to get the profile of the data set, by measures of location (Average and Median-Md), dispersion (standard error - ε, the standard deviation-s, coefficient of variation-CV) and distribution (asymmetry - a4, and Curtose - a3), and inferential analysis through the Mann-Whitney test (SIEGEL, 1956) compared themselves all variables alone for GM and LG, and there α = 5.00%.

**PRESENTATION AN DISCUSSION OF THE RESULTS**

**Results**

Table 1 shows the results of the descriptive variables of the sample (GL).

Analyzing table 1, it was found that the variable age (29.43 ± 6.99), %G (18.88 ± 4.25), the FLBR test (29.43 ± 9.57) and FLAB test (28.09 ± 8.95) obtained a high dispersion (CV > 20%), so the group does not present a uniformity characteristic. The GL is presented in a uniform manner only for the height variables (163.59 ± 6.63) and body mass (57.93 ± 7.80). Only the height variable (163.59 ± 6.63) is close to the normal distribution, the other follows other probability distributions. From the results for the FLBR test, the group has demonstrated a good level of classification, while for the FLAB test the level of classification was average. On the fat% (18.88 ± 4.25), the group was classified as excellent, for the average age (POLLOCK & WILMORE, 1993).

In table 2 the results for the group of bodybuilding women practitioners are described (GM).

**Table 1 - Descriptive Results – GL (n=25)**

<table>
<thead>
<tr>
<th>Statistics</th>
<th>Average</th>
<th>ε</th>
<th>Md</th>
<th>CV (%)</th>
<th>s</th>
<th>a4</th>
<th>a3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>29.43</td>
<td>1.46</td>
<td>31.00</td>
<td>23.76</td>
<td>6.99</td>
<td>-1.75</td>
<td>-0.25</td>
</tr>
<tr>
<td>Height</td>
<td>163.59</td>
<td>1.38</td>
<td>165.00</td>
<td>4.05</td>
<td>6.63</td>
<td>-0.36</td>
<td>-0.35</td>
</tr>
<tr>
<td>Body Mass</td>
<td>57.93</td>
<td>1.63</td>
<td>55.60</td>
<td>13.47</td>
<td>7.80</td>
<td>-0.61</td>
<td>0.47</td>
</tr>
<tr>
<td>%G</td>
<td>18.88</td>
<td>0.89</td>
<td>18.87</td>
<td>22.52</td>
<td>4.25</td>
<td>1.33</td>
<td>1.10</td>
</tr>
<tr>
<td>FLBR</td>
<td>29.43</td>
<td>2.00</td>
<td>30.00</td>
<td>32.52</td>
<td>9.57</td>
<td>1.07</td>
<td>0.36</td>
</tr>
<tr>
<td>FLAB</td>
<td>28.09</td>
<td>1.87</td>
<td>26.00</td>
<td>31.88</td>
<td>8.95</td>
<td>7.03</td>
<td>2.32</td>
</tr>
</tbody>
</table>

FLBR= Arm flexion; FLAB= Abdominal flexion.

**Table 2 - Descriptive Results – GL (n=23)**

<table>
<thead>
<tr>
<th>Statistics</th>
<th>Average</th>
<th>ε</th>
<th>Md</th>
<th>CV (%)</th>
<th>s</th>
<th>a4</th>
<th>a3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>25.75</td>
<td>1.12</td>
<td>24.00</td>
<td>19.39</td>
<td>4.99</td>
<td>-0.02</td>
<td>0.84</td>
</tr>
<tr>
<td>Height</td>
<td>164.20</td>
<td>1.16</td>
<td>162.50</td>
<td>3.16</td>
<td>5.19</td>
<td>-0.49</td>
<td>0.49</td>
</tr>
<tr>
<td>Body Mass</td>
<td>60.43</td>
<td>1.43</td>
<td>61.00</td>
<td>10.60</td>
<td>6.41</td>
<td>0.24</td>
<td>-0.50</td>
</tr>
<tr>
<td>%G</td>
<td>20.61</td>
<td>0.96</td>
<td>20.84</td>
<td>20.79</td>
<td>4.29</td>
<td>0.02</td>
<td>-0.20</td>
</tr>
<tr>
<td>FLBR</td>
<td>20.60</td>
<td>2.14</td>
<td>20.00</td>
<td>46.39</td>
<td>9.56</td>
<td>-1.38</td>
<td>0.14</td>
</tr>
<tr>
<td>FLAB</td>
<td>24.85</td>
<td>1.60</td>
<td>24.50</td>
<td>28.73</td>
<td>7.14</td>
<td>1.14</td>
<td>0.55</td>
</tr>
</tbody>
</table>

FLBR= Arm flexion; FLAB= Abdominal flexion.
Pointing to table 2, it appears that there has been no repetition of the GL occurred because the variable age (25.75 ± 4.49), the stature (164.20 ± 5.19) and body mass (60, 43 ± 6.41) have, on average, the best estimate of central tendency. However, the GI (20.61 ± 4.29), the FLBR test (20.60 ± 9.56) and FLAB test (24.85 ± 7.14) have the average as the best measure of central tendency. So there is a low dispersion (CV < 20.00 %) in the first three variables mentioned. At GM, the anthropometric height measurements, mass and GI% below the normal distribution (asymmetry and curtose close to zero). From the results for the FLBR test, the group showed an average level of classification, while for the FLAB test the level of classification was regular. Regarding GI%, the group was classified as good for the average age (POLLOCK & WILMORE, 1993).

In table 3 the results of the Mann-Whitney test are presented (SIEGEL, 1956), in the context of the inferential approach.

In table 3, we have in the GL column, the sum of the positions of the values corresponding to each individual of that group, and similar content is in the GM column. The third column shows the result of statistical U, characteristic of the test indicated, and Z matches this in the statistical norm. It is observed that for both groups was not statistically significant the noted difference, α = 5%, for the variables age, stature, body, abdominal bending (FLAB). In the group comparison, there were significant differences for the variables GI% and FLBR.

**DISCUSSION**

Marin et al. (2003) used the FLBR test to check the power of upper members, in a study involving two groups of women practitioners of localized workout, a control group (CG, n = 39) and an experimental group (GE, n = 54), he used 1 kg of weight for the upper and lower members exercises. The following results were found: 22.7 ± 4.0 repetitions for the GC and 24.6 ± 3.9 repetitions for GE. Taking into consideration the age variable (68.1 ± 6.5 years GC; 64.6 ± 6.1 years GE), one can infer that this variable contributed to the fact of the values of groups GI and GE have been smaller than the LG group of this study. However, in relation to the values of the GM group, average values found in the study above are higher. The time of practice in the program (7.2 ± 4.0 years GC; 6.7 ± 3.4 years GE) suggests the influence of the principle of continuity, on these results.

Laporta Junior (2001), with the goal of evaluating the effectiveness of the FLBR test corrected by the body mass index, used a sample of 37 military, female, age 25.23 ± 4.84 years, body mass 59.20 ± 7.33 kg and height 164 ± 5 cm. The study found the FLBR test average values of repetition 27.78 ± 4.52. When compared the results of the group of soldiers of that study with this search, there are values lower than GL, but higher than the GM.

Voight et al. (2003) used the Canadian Standard Test of Fitness protocol for FLBR testing, in a group of 30 healthy subjects, females, aged 25.5 ± 9.5 years, practitioners of resistance exercises, with experience in the performance observed. Obtained average of 32 repetitions, which was higher than the values of both groups of this work. This suggests that the principle of specificity influenced these results.

Comparing the levels of classification of the groups GL and GM for the FLBR test, with the standards of reference cited by Pollock & Wilmore (1993), notes that the GL group presented a good level, while the GM group, an average level. This indicates the difficulty of mastering the technique correctly in the implementation of the extension and flexion movement of arms, particularly the GM group, and may be considered as one of the factors that explains the levels of classification found in this study. The difference found in the scores of classification between GL and GM groups, in this work, could be explained because of the movement of the FLBR test be an exercise used in basic classes of localized workout. In planning this mode, has been designed to work the chest muscles, through this referred exercise, while that in bodybuilding, works the same muscles in the exercise of straight supine.

Marchese et al. (2002), in their studies in order to assess the RML in a group of nine women in the age group of 14 to 52 years, practitioners of GL, used the FLBR and FLAB tests. Although the age range has been high, results were found below the LG group, for FLBR testing (25.4 ± 11.1 repetitions), but higher than the GM group, this study. For the FLAB test (30.7 ± 6.4 repetitions), the average value was higher than those submitted by the GL and GM groups.

The same happened with respect to the results obtained by Baptista & Dantas (2003), to examine the development of physical capacity in 60 women, aged 37.60 ± 4.82 years, practitioners of academy gymnastics. They were subjected to a training program consisting of classes in localized workout, step, power-local, jump-training and stretching over four months. This group presented on the FLBR

**Table 3 - Results from the inferential analysis between GL and GM groups**

<table>
<thead>
<tr>
<th>Variables</th>
<th>GL</th>
<th>GM</th>
<th>U</th>
<th>Z</th>
<th>P-value</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>570</td>
<td>376</td>
<td>1.66</td>
<td>1.57</td>
<td>0.12</td>
<td>Don’t reject H0</td>
</tr>
<tr>
<td>Height</td>
<td>502.50</td>
<td>443.50</td>
<td>226.50</td>
<td>-0.09</td>
<td>0.93</td>
<td>Don’t reject H0</td>
</tr>
<tr>
<td>Body Mass</td>
<td>502.50</td>
<td>443.50</td>
<td>226.50</td>
<td>-0.09</td>
<td>0.93</td>
<td>Don’t reject H0</td>
</tr>
<tr>
<td>GI%</td>
<td>395</td>
<td>550.50</td>
<td>185.50</td>
<td>-2.19</td>
<td>-0.02</td>
<td>Rejects H0</td>
</tr>
<tr>
<td>FLBR</td>
<td>613.50</td>
<td>332.50</td>
<td>122.50</td>
<td>-2.62</td>
<td>0.01</td>
<td>Rejects H0</td>
</tr>
<tr>
<td>FLAB</td>
<td>550.50</td>
<td>395.50</td>
<td>185.50</td>
<td>-1.09</td>
<td>0.20</td>
<td>Don’t reject H0</td>
</tr>
</tbody>
</table>

FLBR = Arm flexion; FLAB = Abdominal flexion
test an average of 25.10 ± 3.10 repetitions, so higher than the average value of the GM group, in this search. To the FLAB test, the authors found an average of 38.15 ± 2.93 repetitions. These values were higher than those of the GL and GM groups, in this study. These results suggest that the planning, the methodology used in gymnastics localized workout classes and specific experience of the movement can influence on the results.

Valley & Dantas (2003) conducted a study involving 34 subjects, 68% of females (n = 23), aged between 20 and 60 years (36.22 ± 8.68 years), subjected to a program of bodybuilding during four months. Found average of 19.52 ± 10.59 repetitions for the FLBR test, and 20.52 ± 10.46 repetitions for the FLAB testing. When compared to the values of this study, it is observed that are lower than the average values of both the LG group, and the GM group’s. These findings infer once again in the need to consider the importance of the methodology and planning of the training, in addition to the specificity of movement.

Ivo et al. (2002) analyzed the physical capacity of women practitioners of localized workout in gymnastics academy, in a sample of 30 women, divided into two groups of 15 participants each. As a group, the average age was 27.50 ± 4.77 years (G1) and another 36.60 ± 5.82 years (G2). The following results were found for the FLBR test: 26.00 ± 2.82 repetitions for G1 and 26.10 ± 3.12 repetitions for G2. As for the FLAB test, average values of G1 were 34.30 ± 2.62 and G2 were 27.50 ± 3.41 repetitions. The figures presented by the G1 group, as compared to the GL group in this work are lower for the FLBR test, but higher for the FLAB test. As for the average values of the G2 group, they are lower than the scores of the GL group both in the FLBR test, as in the FLAB test. For average values of the GM group of this study, the G1 and G2 groups showed superior results in both tests.

It is observed in both studies that the scores submitted by the group of localized workout were greater than the values of the bodybuilding group. This suggests, according to the principle of volume x intensity, that physical muscle located resistance quality is worked with greater emphasis on the activity of localized workout.

With respect to the classification of the GL and GM groups for the FLAB test when compared to standard reference cited by Pollock & Wilmore (1993), the LG group presented an average level, while GM group a regular level. This indicates the difficulty in mastering the technique correctly in the implementation of the movement of abdominal flexion, in that test. The levels of classification of the GL and GM groups for the FLAB test, indicate the difficulty in mastering the technique correctly in the implementation of the movement of abdominal flexion, in that test. It is suggested then that to assess the RML of abdominal muscles, should be used to partial flexion of the body stem, considering how the main straight abdominal muscles, upper and lower portion.

It is recommended that in future studies, in order to obtain more reliable conclusions, the increase in the group of volunteers and multivariate approach in the treatment of the data. This will enable the achievement of a general focus on the arrangements and, therefore, greater precision in the same comparison.

REFERENCES


