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Effects of a Program "Circuit Training" on Anthropometric Variable and Composition Body in Military Police

Leonardo Gomes Ferreira*

University Salty Olive-Universe / Physical Education Teacher Graduate Sports Training, Military Police of the State of Rio de Janeiro, Fitness Program – PMERJ, Brazil

Abstract

The aim of the study was to determine whether changes occurred in anthropometric and body composition in full military policemen on the 7th bpm state of Rio de Janeiro undergoing a program of "Circuit Training", the sample consisted of 30 officers aged 23 and 45. Measure the mass and body height, circumferences (forearm, arm relaxed, contracted arm, abdomen and waist, thigh and calf); skinfolds (subscapular, triceps, biceps, chest, axillary average, abdomen, suprailiac, thigh and calf) and the sum of all the folds of the trunk. Body density was estimated using the equation Petroski and %BF Siri equation. Between the pre and post-test, there were 30 sessions of Circuit training, 2 times a week, lasting 30 minutes and the intensity controlled by FC. Descriptive statistics were used to through Student t test for dependent samples for data analysis. Based on the results of significance was found ($p<0.05$) in body girth 9, 4 skinfold fat in the total fat percentage and fat mass.

Keywords: Body fat; Anthropometry; Physical conditioning

Introduction

In practice regular physical exercise, mainly related to running and gymnastics in gyms has increased considerably in recent decades. Such interest with the goal of improving the cardiorespiratory as well as combat localized fat, and prevent diseases related to excess weight, since being overweight and sedentary lifestyle are contributing stop disease risk such as cardiopulmonary problems, hypertension, diabetes and renal disorders [1-3].

Second Schenk and Malta [4,5] 80 marked the explosion of magazines and newspapers related with "Fitness" sport of mass and physical assessment programs, along with the academies provided to society, the different forms of physical activities, including the "Circuit Training".

According to Carvalho [6], Juca [7], Saucer Neto [8] the "Circuit Training" is an easy way to perform functional exercises, with stints sequences of exercises with varying joint positions. The relevance of a program "Circuit Training" consists in the improvement of Cardiorespiratory and Neuromotor, which has gained many fans due to improved health and make positive changes in esthetics.

Although there are few studies that have wished to characterize the effects of physical activity in different modalities, some relevant parameters of body composition and physical fitness, involving university [9-12]. Thus, the aim of this study was to examine whether there were changes in anthropometric and body composition in full military policemen 7 bpm in the participants in a fitness program in state of Rio de Janeiro.

Materials and Methods

The sample consisted of 30 police officers, aged between 23 and 45 years, participants fitness program CEFD, "Circuit training".

The program "Circuit Training" was held in 15 weeks, often bi-weekly and last approximately 45 minutes. Each exercise session was held in a progressive intensity 60-85% of maximum heart rate (HR) according to the suggestions of the American College of Sports Medicine [13]. The intensity was controlled by checking the FC training as the proposition by Karvonen [14].

Each training phase was produced with the following parts: muscle activation than 5 minutes, with shifts in position cones, "Circuit Training" about 15-20 minutes and is composed of global elements, axes and planes in front, side, DV (Prone), DD (supine), regeneration post-Aerobic about 5-10 minutes atilizando up exercises regeneration, back calm and choreographed rhythms of HR, part of neuromuscular about 10 minutes, with exercises localized targeting different muscle groups as work arms, abdominals and lower limbs, stretching and relaxing about 5-8 minutes with light exercises aimed lengthening muscles worked.

Anthropometric data were collected no7BPM/PMERJ, the dependencies of the physical conditioning program, the first two weeks (pre-test) and in the last two weeks (post-test). Thus, Measure is the body mass (BM, kg), using a scale Balmak with 100 g precision, the height (cm), through the wall stadiometer accurate to 0.1 cm, according to the procedures of Gordon et al. [15], skinfolds (DC, mm) subscapularis (SE), triceps (TR), biceps (BI), chest (PE), axillary oblique (AXO), abdomen vertical (ABV), supra iliac oblique (SIO), thigh (CX) and calf (PA), according to Harrison et al. [16], with variation of vertical bending abdomen, which was assessed as Pollock and Wilmore, all of which are measured with skinfold INNOVARE CESCORF and body girth (PC, cm) of the forearm (PAN), relaxed arm (PBR) and contracted (PBC), addômen cord (PABU) and waist (PABC), Normal Trunk (PTN), gluteus (PG), thigh (PCX) and calf (PPA), according to Behnke and Wilmore [17], measured with metric tape.

We used the generalized equeção forthe females between ages 18-

***Corresponding author:** Leonardo Gomes Ferreira, University Salty Olive-Universe / Physical Education Teacher Graduate Sports Training, Military Police of the State of rio de janeiro, Fitness Program – PMERJ, Brazil, Tel: (21) 2333-6071; E-mail: cefd@pmerj.rj.gov.br

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51 years, proposed by Petroski [18] for the calculus of density (D), ondeD 1,039872980,00031853 = * (Σx9DC) +0.00000047 * (Σx9)² - 0.00025487 * (ES), where: ID = age (years), BM = body mass (kg), ES = body height (cm) and Σ9DC = (TR + BI + SE + PE + AM + AB + SI + CX + PM) and S9DC². Percent fat (%) was obtained by equation proposed by Siri [19] where G =% (495 / D) -450.

Fat mass (MG, Kg), was obtained from the equation, MG, Kg = (%G/100) * MC, Kg, and lean body mass (LBM, kg), was obtained by the equation MCM, Kg = MC-MG.

The assessment of distribution of fat, may be evidenced by methodologically compartments or regions of the body with sharp properties of localized fat deposits. So, were analyzed by the sum of skinfolds trunk, ΣDCT = SE + PE + AXO + ABV + SIO, upper trunk, ΣDCTS = SE + PE + AXO and lower trunk DCTI + ABV = SIO, sum of skinfolds members, ΣDCM = CX + PA, but also the sum of all skin folds above cited, ΣDCTOT = T + M, which represents the total fat (mm).

To achieve the proposed objective, the statistical treatment consisted of descriptive statistics, and "t" test for dependent samples with the level of p<0.05. Data analyzes were performed using Microsoft Excel 2010.

Results and Discussions

The results of test between the pre and post-test and discussion relative to variables anthropometric of group were defined of agreement with the Table 1.

It was found, through the Table 1 that to analyze the variable mass body there changes quantitative that were highly statistically significant, p>0.05. With relationship to stature, thet esttindi-Cou that this variable remained stable on Elapse of programof "Circuit Training." Duarte and Matsudo [20] through a longitudinal study of college students, mean age end of 21 years, found that there was significant increase in this variable, assuming According to the authors, this increase was due to the posture correction, occurred,

gradually during the course of Physical Education.

Observed that, in Table 2, the dependent t-test showed statistically significant differences (p<0.05) in all regions of the trunk (PTN), abdominal umbilical, (PABU), waist (PABC), gluteal (PG), relaxed arm, (PBR) and contracted (PBC) and forearm (PaNb). With respect to the lower limbs, found significant differences in all perimeters. Note, that the largest percentage difference was 5.95% in umbilical abdominal circumference (PABU). These findings are in agreement with Pollock and Wilmore [3], Gubiani and Pires Neto [21], Olson et al. [22] who report that measurements of waist and buttock are excellent indicators

Variables	pre-test	post-test	%	t	P
Age (years)	31.10 ± 0.3	32.17 ± 0.38	-3.33%	2.05	0.326
Mass corp. (Kg)	84.68 ± 2.63	81.23 ± 1.88	4.17%	2.05	9.96509 E-10
Height (cm)	1.74 ± 0.04	1.74 ± 0.04	0	-1.00	0.328

Table 1: Character descriptive of variables anthropometric the sample and test dependent.

Variables	pre-test	post-test	%	t	p
PBR	34.27 ± 0.45	35.87 ± 1.17	-4.46%	2.05	0.000000003
PBC	37.36 ± 1.22	38.77 ± 0.86	-3.64%	2.05	0.0000004
PaNb	26.42 ± 1.36	27.12 ± 1.34	-2.58%	2.04	3E-11
LWA	76.20 ± 1.80	76.96 ± 1.30	-0.99%	2.04	0.00003
PABU	69.75 ± 0.81	65.83 ± 0.92	5.95%	2.05	3,78 E-17
PABC	71.20 ± 1.72	68.57 ± 0.96	3.84%	2.05	0.00000003
PG	95.05 ± 1.24	96.74 ± 0.67	-0.75%	2.05	0.000000002
PCX	56.55 ± 0.84	57.76 ± 0.45	-2.09%	2.05	0.0000002
ANPP	36.61 ± 0.72	37.45 ± 0.57	-2.24%	2.05	0.000004

Table 2: Values average and test dependent to the perimeters body in cm.

Variables	pre-test	post-test	%	t	p
TR	15.47 ± 1.06	14.16 ± 1.15	9.25%	2.05	3.31 E-17
BI	7.94 ± 0.64	7.15 ± 0.66	11.05%	2.05	0.0000000
SE	13.87 ± 1.01	13.23 ± 1.02	4.84%	2.05	9,12 E-17
PE	10.86 ± 0.67	10.29 ± 0.69	5.54%	2.05	2.50413 E-13
AXO	10.67 ± 0.59	10.29 ± 0.68	3.69%	2.05	0.03
ABV	20.49 ± 0.68	19.84 ± 0.71	3.28%	2.05	2.41-13
SIO	15.98 ± 1.11	15.40 ± 1.16	3.77%	2.05	0.0000001
CX	31.93 ± 1.01	31.11 ± 0.98	2.64%	2.05	0.000000003
PA	18.01 ± 0.79	17.38 ± 0.89	3.62%	2.05	1.83 E-15

Table 3: Values average and test dependent to the folds cutaneous in mm.

to show reductions in body fat. These differences in the mean values of the perimeters can be explained by the fact that the sessions of "Circuit Training", held in sports, were performed with progressive intensity 60-85% of maximum heart rate, according to the American College of Sports Medicine [13], where more emphasis was given to the aerobic phase. Olson et al. [22], Stanforth et al. [23], Fornari et al. [24], and Conti [25] explain that the exercise intensity, the duration of the aerobic phase are crucial to promote changes in the cardiovascular level and caloric expenditure.

Thus, Fett et al. [26], in a study of body composition and somatotype of overweight and obese women before and after circuit training or walking, observed greater action electromyography to analyze muscle groups of the lower rectus femoris, vastus medialis and lateral extensor knee. However, the gluteus maximus and rectus abdominis have changed in exercises with type board. It is understood that the exercise circuit benefits not only to the areas of greatest incidence of the same, but reflected also in places apparently not affected by the action or did not participate directly in this. So the "Circuit Training" benefits the body as a whole. The present study showed a reduction of fat in the body in general, and less effect on the lower limbs.

It was found, represented by Table 3, the mean values of skinfolds regions of the upper limbs, statistically significant at p<0.05 in all skin folds. There is still the largest percentage reduction of 11.05%. results similar to this study, in relation to skinfolds, were found by Lopes [11], who found significant reductions in the biceps, skinfold and subscapularis , and studies of Alexander et al. [27] axillary average as also by Wilmore [28] values of folds of chest axillary average subscapularis abdomen and suprailiac, after four and ten weeks of physical exercises program (1968) the folds of biceps and abdomen.

In Table 4 are the values of summations off olds cutaneous by region and total the sample in study that represent respectively the fat regional and full. Ve-rificou up, through of testt, differences statistically significant (P<0.05) regionalized in all fats and complete ((ΣDCTOT, ΣDCT, ΣDCM, ΣDCTS, ΣDCTI, ΣDCMS, ΣDCMI). However, note that the largest differences percentage of 9.85 and 5.14% occurred in ΣDCMS (biceps + triceps) e ΣDCT (SIO +ABV+SE+TR+PE).

Björntorp [1], Pollock and Wilmore [3], Muller and Wohlleb [29] quote aspecttos important the distribution off at regional and total due to fact of that the increase of tissue adipose in some regions, mainly in region of trunk superior which is metabolically more active that the fat located in region of members and thus more able of predict the risk of diseases cardiovascular. In this sense, the analysis the distribution off at corporal has if justified market, mainly when this reflects the effects of "Circuit Training" or other at ividads physical in relationship to segments body.

In composition corporal (Table 5) occurred differences statistics significant in level of p<0.05 between the pre and the post-test the real increase on value average the density on post test that if reflected in reduction of %G increase the MCM. Thus, it is inferred that the subject

Variables	Pretest	Posttest	%	T	p
DCTOT	150.02 ± 8.03	142.72 ± 8.41	5.11%	2.05	0.000
DCT	76.67 ± 4.53	72.92 ± 4.73	5.14%	2.05	0.001
DCM	73.35 ± 3.5	69.8 ± 3.68	5.09%	2.05	0.003
DCTS	35.4 ± 2.27	33.81 ± 2.39	4.70%	2.05	0.019
DCTI	40.71 ± 2.79	38.92 ± 2.87	4.60%	2.05	0.028
DCMS	23.41 ± 1.7	21.31 ± 1.81	9.85%	2.05	0.030
DCMI	49.94 ± 1.8	48.49 ± 1.87	2.99%	2.05	0.026

Table 4: Values average and test dependent between the summations of folds cutaneous by region of body.

Variables	pre-test	post-test	%	t	p
D (g / cc).	1.046 ± 0.01	1.047 ± 0.01	-0.10%	2.05	0.000
% G	23.18 ± 4.84	22.84 ± 4.86	1.49%	2.05	0.000
Mg (kg)	13.45 ± 5.04	13.22 ± 5.00	1.74%	2.05	0.000
LBM (kg)	43.15 ± 4.04	43.22 ± 4.05	-0.16%	2.05	0.316

Table 5: Values average and test dependent between the medium of components the composition body.

of present study decreased the amount off at corporal and increased the MCM. The reason for this occurrence is related to regularity and efficiency with which police practice training program circuits.

The values average of %G MG were significantly reduced ($P<0.05$). These findings, are of agreement with the studies of Wilmore [28], Johnson et al. [30], Cardoso et al. [31], Carrizo and Garcia [32] when studied the effects of activities physical about these variables. The differences significant us values average of %G and interpreted by the criteria reported in Heyward [33] indicate that the subject of this study are Classified in the appropriate pattern of body fat, since this pattern to police is between 22 and 25% body fat. On average these officers have had since joining the program, an appropriate level of body fat, and these have been significantly reduced, which makes it possible to assume that the regularity and efficiency of the program "Circuit Training" determinates were to reduce the %G.

With relationship to MCM, the test showed a similarity between the values average, with a trend of increase very although not have been found significant differences. The possible justification, to this similarity, can be assigned to type of activity that was developed where the more emphasis was given to exercises Aerobic in platforms of 10 cm of time that possible the reduction the fat regional and relative without however, change expressively the MCM.

Conclusions

Against of results this study that had as goal check if occur changes significant at the variables anthropometric and composition corporal in military police, that participation on the program of "Step Training" of-Centro physical education PMERJ, RJ, can measure the that follows:

The sessions of exercises physical with "Step Training" practiced regularly were efficient at the reductions the fat corporal relative absolute and by region of body of police 7 bpm. These results lead the suggest about the importance the evaluation of variables anthropometric by region corporal well as us components the composition body in groups involved in program of "Circuit".

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