Original Article

Exercise training programs and detraining in older women

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ABSTRACT

The aim of the study was to evaluate the effects of exercise training programs and detraining. Fifty-one aged women participated in two supervised exercise programs: a group of land-based exercise and a group of land-based exercise plus aquatic exercise, both being evaluated at the baseline after nine months of intervention and three months of detraining. After intervention, both groups had decreased blood pressure and improved resistance of the lower and upper limbs. After a detraining period, both groups showed significant increase in blood pressure while resistance of lower and upper limbs, agility and aerobic capacity had a significant decrease. **Key words:** FUNCTIONAL TESTS, HEMODYNAMIC PROFILE, ANTHROPOMETRIC PROFILE

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INTRODUCTION

As the average life expectancy and the number of older people increases, it has proven crucial to ensure the quality of life in the older people (Carrilho & Patrício, 2010).

The increase of life expectancy is associated with comorbidities due to the aging process (Teixeira-Samela et al., 2005) resulting in a progressive loss of the body's functional abilities, increasing the sedentary risk (Alves, Mota, Costa & Alves, 2004; Rikli & Jones, 1999b). It also induce loss of body mass, strength and functional balance (Bird, Hill, Ball, Hetherington & Williams, 2011).

Age, as a non-modifiable risk factor, is associated with degenerative changes leading to increased multimorbidity, however, physical activity is one of the basic elements of primary and secondary prevention. Quality of life is an important issue that is indirectly dependent of the life style (Różańska-Kirschke, Kocur, Wilk & Dylewicz, 2006). Thus, promoting functional fitness is essential to ensure a good quality of life in older people (Karinkanta et al., 2006).

Functional fitness is defined as having the physiologic capacity to safe and independently perform daily life activities without undue fatigue and includes components such as lower and upper body resistance, lower and upper body flexibility, aerobic capacity and motor agility/balance (Rikli & Jones, 1999b).

One way of intervening with these age-related changes is the regular practice of physical activity, which has shown to be a simple, low-cost and effective strategy to minimize those effects, consequently reducing the social and economic cost of the health care system (Teixeira-Samela et al., 2005).

Supervised exercise contributes significantly to the maintenance of physical fitness of the elderly, either in their present health or in their functional capabilities (Alves et al., 2004).

Multicomponent exercise programs are becoming increasingly popular among older population and appears to be associated with several health benefits (Toraman & Salin, 2004). Multicomponent training is defined as a well-rounded program including endurance, strength, coordination, balance and flexibility exercises (Carvalho, Marques & Mota, 2008).

Current recommendations have recognized that a combination of aerobic activity, strength training, coordination, balance and flexibility exercises are important for maintaining physical function in older adults (ACSM, 2013; Dermott & Mernitz, 2006).

Despite studies suggesting that exercise training programs help attenuate the effects of aging process on functional fitness (Toraman & Salin, 2004), it is not known for how long these beneficial effects persist (Toraman & Ayceman, 2005).

There is a lack of evidence proving that simultaneously prescribed doses and intensities of strength, aerobic, and balance training at levels known to produce physiological adaptation in older adults are both feasible and capable of eliciting changes in physical functioning and quality of life (Baker, Atlantis & Singh, 2007). A review of exercise training programs for older adults outlines either the lack of effectiveness or the lack of data supporting effectiveness, at long-term follow up (Bij, Laurant & Wensing, 2002).

On the other hand, there is an issue with exercise training programs because most arise seasonally thus being followed by detraining. This often occurs in previously sedentary people who participate in exercise training programs for several weeks or months and then stop (Dudley & Snyder, 1998). In Portugal, most exercise training programs for older people are provided by local municipalities, seasonally managed in order to reduce costs.

A study has described that both morphologic and functional adaptations can decrease even after short detraining periods (Toraman & Ayceman, 2005). Despite evidence of physiological decline during detraining, there is not enough data suggesting how long the beneficial effects of training are maintained and how functional fitness changes following the cessation of an exercise training stimulus in older women (Carvalho et al., 2008).

Some studies on detraining in older people have evaluated the effects after stopping land-based resistance training of low to high intensity (Tokmakidis, Spassis & Volaklis, 2008) or multicomponent programs (Carvalho et al., 2008). To the best of our knowledge, few studies have reported the effects of detraining after a water-based exercise program and they have evaluated functional ability only in people with neuromuscular and cardiovascular illness (Bocalini, Serra, Rica & Santos, 2010).

Despite some evidence of physiological decline after short detraining periods (Toraman & Ayceman, 2005) there are insufficient data on functional fitness and quality-of-life changes in healthy older women when a water-based exercise program ends (Bocalini et al., 2010).

Therefore, the purpose of the present study was to analyze and compare the hemodynamic, anthropometric and functional profile in older women after training and detraining periods on two multicomponents exercise programs.

MATERIALS AND METHODS

Participants

Fifty one caucasian older women functionally independent volunteered to participate in the study. Before the program started the participants were informed about the purpose and procedures of the study. They signed an informed consent, and were also advised to maintain their previous lifestyle throughout the study, including dietary patterns and physical routines. This study was approved by the ethics committee of the institution where the study was carrying out. Following this procedure, the older women underwent a medical evaluation to attend the program. The exclusion criteria for the study were the following: a) having already participated in any physical activity program; b) osteoarticular dysfunction that could interfere with the performance of the proposed exercises; c) heart problems where the exercise prescription injures the health of the older, d) medical contraindication, and e) having not attended to more than 80% of the training sessions of the program. Only fifty one women (68.22±9.12 years and 155.94±6.62cm) have completed the exercise program, however in our results the number of subject changes because they did not complete all the evaluation tests. The subjects were divided into two groups by the ABBA method (Davidson, Perkin & Buckley, 2004). One group consisted in 27 older land-based exercising women (G1) while the other included 24 older land-based plus aquatic-exercising women (G2). Due to chlorine allergy two women had to be excluded from G2.

Experimental design

The exercise training program was performed during a period of nine months, October to June, with an interruption of three months (detraining) from July to September. The functional capacity, hemodynamic and anthropometric profile assessments were conducted in baseline and after the intervention period. Participants were tested on three occasions. The first assessment occurred during the first week of October (before the beginning of the exercise program), the second during the first week of July (after the exercise program ended) and the third during the first week of October (after a detraining period). All assessments were performed under the same environmental conditions (place, time of day, order of tests application, temperature and humidity, respectively, 22º-24ºC and 55-65%) and by the same examiner.

Intervention

The main goals of the exercise training program were based on improving the functional capacity according to the American College of Sports Medicine guidelines for exercise prescription for the elderly, and the main components in this program were cardio-respiratory fitness, general strength, flexibility and balance (ACSM, 2013; Dermott & Mernitz, 2006). The exercise program consisted in group sessions of land-based exercise plus aquatic-exercise. The G1 held twice a week 45min/sessions. The G2 completed the same land-based exercise twice plus aquatic-exercise group classes once a week, 45 min/sessions. All classes were held with appropriate music for the activity regarding the participants' interests and supervised by a certified trained fitness instructor.

The land-based exercise classes were structured in: 10 minutes of general and specific warm-up, 15-25 minutes of cardio-respiratory workout, 15-20 minutes of resistance training and 5-10 minutes of relaxation techniques and stretching.

The aquatic group classes were structured in: 10-min warm-up, 30-min endurance training and a 5-min cool-down/relaxation. Classes were held in a shallow water swimming pool.

The classes focused on aerobic and resistance training. The training programs intensity was moderate,10-14 on the "Rate of Perceived Exertion" scale (Borg, 1982), according ACSM (2013). Subjects were training on the scale used.

Hemodynamic Profile assessment

For the measurement of systolic blood pressure (SBP), diastolic blood pressure (DBP) and resting heart rate (RHR) a digital sphygmomanometer, Omron Digital Blood Pressure Monitor HEM-907 (Omron Healthcare Europe BV, Matsusaka, Japan) was used. Measurements were collected for three trials in a sitting position, after 15 min rest and with the left arm in support, with 5 minutes intervals (AHA, 2005). They were registered in two consecutive days and the mean value was considered.

Anthropometric measures

Anthropometric measures were obtained while subjects were dressed in light clothing without shoes. Height and body mass were recorded using a portable stadiometer and balance weighting scales (Seca, Hamburg, Germany), respectively. Percent body fat (%BF) was measured using a bio-electrical impedance device OMRON BF 303 (OMRON Healthcare Europe BV, Matsusaka, Japan). Body mass index (BMI) was calculated using the standard formula: mass (kg)/height^2(m).

Battery of functional tests assessment (Fullerton test)

Functional tests chosen from the battery of Fullerton Functional Fitness test (Rikli & Jones, 1999a, 1999b) were: the arm curl, the 30-second chair stand, the 6-minute walk and 8-foot up and go test. The balance tests chosen from the Fullerton Advanced Balance Scale were: step up and over, standing on one leg, stand on foam with eyes closed and 10 foot line test (Rose, Lucchese & Wiersma, 2006).

Statistical Analysis

Initially we used descriptive statistics in order to describe and characterize the sample. Shapiro-Wilk and the Levene tests were used to assumption normality and homoscedasticity, respectively. It was used two-way ANOVA with repeated measures for the variables that obtained normal distribution and it was used ANOVA-Friedman and Mann-Whitney tests were used for the variables that not obtained normal distribution to compare different moments and different groups. Results were significant in the interaction (p≤0.05) and all data were analysed using SPSS version 22.0 (SPSS Inc., Chicago, IL) for Windows statistical software package.

RESULTS

In order to compare groups, some women were excluded due to not completing all the tests. For the same purpose, variables were divided by statistic used. Table 1 and Table 2 show the results between groups at baseline, after 9 months of intervention and after 3 months of detraining.

Non-parametric statistic showed significant differences between groups in step-up and over test at baseline (p=0.033) and post-training (p=0.037). Parametric statistic showed significant differences between groups in chair stand test at baseline (p=0.017) and 6-min walk test at detraining (p=0.031).

Table 1. Non-parametric statistic, comparing groups at baseline, post-training and detraining periods for standing on foam with eyes closed (SFEC), 10-foot line (10FL), standing on one leg (SOL), step up and over (SUO), resting heart rate (RHR), of subjects mean ± SD.

Assessments	**G1 vs G2** (baseline)	**G1 vs G2** (post-training)	**G1 vs G2** (detraining)
G1 - SFEC (n) *,†,‡	3.04 ± 1.40 (27)	2.68 ± 1.38 (25)	2.23 ± 1.38 (22)
G2 - SFEC (nr) *,†,‡	3.22 ± 1.28 (23)	2.61 ± 1.20 (23)	2.74 ± 1.01 (23)
	p= 0.849	p= 0.775	p= 0.224
G1 - 10FL (nr) *,†,‡	2.67 ± 1.44 (27)	2.81 ± 1.33 (26)	2.52 ± 1.28 (23)
G2 - 10FL (nr) *,†,‡	2.63 ± 1.31 (24)	3.13 ± 0.85 (24)	2.54 ± 0.88 (24)
	p= 0.977	p= 0.659	p= 0.704
G1 - SOL (s) *,†,‡	1.89 ± 1.25 (27)	2.04 ± 1.46 (26)	1.74 ± 1.25 (23)
G2 - SOL (s) *,†,‡	1.75 ± 1.03 (24)	1.79 ± 1.02 (24)	1.75 ± 0.99 (24)
	p= 0.879	p= 0.630	p= 0.635
G1 – SUO (nr) *,†,‡	3.19 ± 1.36 (27)	3.12 ± 1.45 (26)	3.22 ± 1.45 (23)
G2 - SUO (nr) *,†,‡	4.61 ± 3.10 (23)	3.83 ± 0.57 (24)	3.50 ± 0.83 (24)
	p= 0.033	p= 0.037	p= 0.938

G1 - RHR (bpm) *,†,‡	70.15 ± 11.68 (27)	71.63 ± 9.98 (27)	72.59 ± 11.93 (27)
G2 - RHR (bpm) *,†,‡	69.75 ± 14.54 (24)	69.50 ± 9.06 (24)	70.74 ± 10.49 (23)
	p= 0.850	p= 0.527	p= 0.572

* significant differences between G1 vs G2 at the baseline (p< 0.05).
† significant differences between G1 vs G2 at post-training (p< 0.05).
‡ significant differences between G1 vs G2 at detraining (p< 0.05).

Table 2. Parametric statistic, comparing groups at baseline, post-training and detraining periods for weight (kg), Body fat (BF-%), BMI (kg/m2), systolic blood pressure (SBP), diastolic blood pressure (DBP), 30-s Chair Stand (CS), agility (AG), arm curl (AC), 6-min walk (MWT6), of subjects mean ± SD.

Assessments	**G1 vs G2** (baseline)	**G1 vs G2** (post-training)	**G1 vs G2** (detraining)
G1 – weight (kg) *,†,‡	74.96 ± 11.03 (27)	75.39 ± 11.23 (27)	75.69 ± 10.88 (27)
G2 – weight (kg) *,†,‡	74.92 ± 9.69 (24)	75.49 ± 9.66 (24)	75.58 ± 9.43 (24)
	p= 0.989	p= 0.973	p= 0.970
G1 – BMI (kg/m^2) *,†,‡	30.76 ± 4.44 (27)	30.93 ± 4.41 (27)	31.06 ± 4.30 (27)
G2 – BMI (kg/m^2) *,†,‡	30.96 ± 3.93 (24)	31.21 ± 4.04 (24)	31.22 ± 3.78 (24)
	p= 0.869	p= 0.815	p= 0.883
G1 – BF (%)*,†,‡	40.35 ± 5.19 (24)	41.57 ± 5.09 (27)	41.60 ± 4.84 (26)
G2 – BF (%)*,†,‡	42.61 ± 4.09 (22)	43.84 ± 3.62 (24)	44.02 ± 3.54 (23)
	p= 0.110	p= 0.076	p= 0.074
G1 - SBP (mmHg) *,†,‡	137.38 ± 24.86 (27)	124.44 ± 17.14 (27)	132.96 ± 17.49 (27)
G2 – DBP (mmHg) *,†,‡	137.83 ± 21.14 (24)	128.25 ± 13.45 (24)	135.08 ± 15.88 (24)
	p= 0.993	p= 0.386	p= 0.654
G1 - DBP (mmHg) *,†,‡	74.63 ± 10.23 (27)	67.48 ± 11.22 (27)	73.44 ± 11.77 (27)
G2 - DBP (mmHg) *,†,‡	75.25 ± 11.52 (24)	66.29 ± 6.81 (24)	68.75 ± 9.98 (24)
	p= 0.839	p= 0.654	p= 0.134
G1 - CS (nr) *,†,‡	18.58 ± 4.60 (26)	21.46 ± 6.10 (26)	18.77 ± 4.49 (22)
G2 - CS (nr) *,†,‡	25.82 ± 14.08 (22)	23.67 ± 3.91 (24)	19.83 ± 3.68 (23)
	p= 0.017	p= 0.138	p= 0.393
G1 - AG (s) *,†,‡	5.96 ± 2.86 (27)	6.94 ± 5.69 (26)	7.96 ± 5.32 (22)
G2 - AG (s) *,†,‡	5.59 ± 2.46 (23)	4.67 ± 0.73 (24)	6.43 ± 1.10 (23)
	p= 0.626	p= 0.058	p= 0.182

G1 - AC (nr) *,†,‡	21.72 ± 3.96 (25)	22.58 ± 4.31 (26)	19.82 ± 4.86 (22)
G2 - AC (nr) *,†,‡	21.76 ± 5.67 (24)	24.25 ± 3.03 (24)	20.13 ± 3.31 (23)
	p= 0.976	p= 0.122	p= 0.801
G1 - MWT6 (m) *,†,‡	480.67 ± 137.03 (24)	516.69 ± 132.55 (26)	472.48 ± 128.79 (25)
G2 - MWT6 (m) *,†,‡	520.11 ± 153.94 (18)	565.14 ± 76.85 (22)	538.91 ± 65.78 (23)
	p= 0.386	p= 0.138	p= 0.031

* significant differences between G1 vs G2 at the baseline (p< 0.05).
† significant differences between G1 vs G2 at post-training (p< 0.05).
‡ significant differences between G1 vs G2 at detraining (p< 0.05).

Table 3 compares the results between baseline, post-training and detraining with the entire sample. Non-parametric statistic showed significant differences in standing on foam with eyes closed (p=0.002) and 10-foot line (p=0.001) tests.

Table 3. Non-parametric statistic, comparing baseline, post-training and detraining periods values for standing on foam with eyes closed (SFEC), 10-foot line (10FL), standing on one leg (SOL), step up and over (SUO), resting heart rate (RHR), of subjects mean ± SD.

Assessments	Baseline	Post-training	Detraining
SFEC (nr) *	3.12 ± 9.52 (51)	2.65 ±1.28 (48)	2.49 ±1.22 (45)
		p= 0.002	
10FL (nr) *	2.65 ± 1.21 (51)	2.96 ±1.12 (50)	2.53 ±1.08 (47)
		p= 0.001	
SOL (s) *	1.82 ± 1.14 (51)	1.92 ±1.26 (51)	1.74 ±1.11 (50)
		p= 0.672	
SUO (nr) *	3.84 ± 2.41 (50)	3.46 ±1.16 (50)	3.36 ±1.17 (47)
		p= 0.125	
RHR (bpm) *	69.96 ± 12.97 (51)	70.63 ±9.52 (51)	71.74 ±11.22 (50)
		p= 0.519	

* significant differences between the baseline, post-training and detraining (G1 and G2) (p< 0.05).

Table 4 compares the results between baseline vs post-training, baseline vs detraining and post-training vs detraining. Parametric statistic showed significant differences between baseline vs post-training in body fat (p=0.045), systolic (p=0.000), diastolic blood pressure (p=0.000) and arm curl (p=0.023) tests; between baseline vs detraining in body fat (p=0.006), agility (p=0.001) and arm curl (p=0.002) tests; between post-training vs detraining in body fat (p=0.009), systolic (p=0.001), diastolic blood pressure (p=0.008), chair stand (p=0.000), agility (p=0.000), arm curl (p=0.000) and 6-min walk (p=0.001) tests.

Table 4. Parametric statistic, comparing baseline, post-training and detraining periods for weight (kg), Body fat (BF-%), BMI (kg/m2), systolic blood pressure (SBP), diastolic blood pressure (DBP), 30-s Chair Stand (CS), agility (AG), arm curl (AC), 6- min walk (MWT6), of subjects mean ± SD.

Assessments	baseline vs post-training		baseline vs detraining		post-training vs detraining	
Weight (kg) *,†,‡	74.94 ± 10.32	75.44 ± 10.41	74.94 ± 10.32	75.63 ± 10.12	75.44 ± 10.41	75.63 ± 10.12
n=51	p= 0.815		p= 0.356		p= 1.000	
BMI (kg/m^2) *,†,‡	30.86 ± 4.17	30.06 ± 4.02	30.86 ± 4.17	31.13 ± 4.02	30.06 ± 4.02	31.13 ± 4.02
n=51	p= 0.852		p= 0.414		p= 1.000	
BF (%)*,†,‡	41.28 ± 4.73	42.34 ± 4.55	41.28 ± 4.73	42.78 ± 4.57	42.34 ± 4.55	42.78 ± 4.57
n=51	p= 0.045		p= 0.006		p= 0.009	
SBP (mmHg) *,†,‡	137.80 ± 22.96	126.24 ± 15.48	137.80 ± 22.96	133.96 ± 16.62	126.24 ± 15.48	133.96 ± 16.62
n=51	p= 0.000		p= 0.477		p= 0.001	
DBP (mmHg) *,†,‡	74.92 ± 10.75	66.92 ± 9.34	74.92 ± 10.75	71.24 ± 11.11	66.92 ± 9.34	71.24 ± 11.11
n=51	p= 0.000		p= 0.057		p= 0.008	
CS (nr) *,†,‡	22.56 ± 11.05	23.21 ± 5.06	22.56 ± 11.05	19.37 ± 4.15	23.21 ± 5.06	19.37 ± 4.15
n=43	p= 1.000		p= 0.270		p= 0.000	
AG (s) *,†,‡	5.71 ± 2.66	5.73 ± 4.36	5.71 ± 2.66	7.18 ± 3.83	5.73 ± 4.36	7.18 ± 3.83
n=45	p= 1.000		p= 0.001		p= 0.000	
AC (nr) *,†,‡	21.89 ± 5.01	23.66 ± 3.93	21.89 ± 5.01	20.05 ± 4.11	23.66 ± 3.93	20.05 ± 4.11
n=44	p= 0.023		p= 0.002		p= 0.000	
MWT6 (m) *,†,‡	497.84 ± 149.19	530.97 ± 116.68	497.84 ± 149.19	496.62 ± 115.517	530.97 ± 116.68	496.62 ± 115.517
n=38	p= 0.358		p= 1.000		p= 0.001	

* significant differences between baseline vs post-training (G1 and G2) (p< 0.05).
† significant differences between baseline vs detraining (G1 and G2) (p< 0.05).
‡ significant differences between post-training vs detraining (G1 and G2) (p< 0.05).

DISCUSSION

Intervention

The most relevant results emerging from this study, after 9 months of training, were the fact that the enrollment on the exercise program of both groups led to significant effects in body fat (p=0.045), systolic (p=0.000), diastolic blood pressure (p=0.000) and arm curl (p=0.023) tests by parametric statistic and in

SFEC (p=0.002) and 10FL (p=0.001) test by non-parametric statistic, however there were few significant differences when comparing groups at baseline (chair stand test, p=0.017) and none and post-training. That means despite the differences between the programs' frequency and training, both promoted similar effects on measured variables. Therefore after 9 months of training there were verified: increases in SFEC, SOL, SUO, AC, MWT6; decreases in SBP and DBP, for both groups. G2 decreased RHR and AG. G1 increased CS.

We find that our results are in line with transversal studies indicating multi-component exercise programs to cause significant improvements in health and functional capacity of elderly individuals (Carvalho et al., 2010; Dermott & Mernitz, 2006; Toraman & Salin, 2004).

In our study, we also attempted to examine the importance of exercise frequency. Regarding that frequency of exercise intervention, we evaluated the effects of an exercise program on functional fitness among independently living old adults. The next study concluded that the exercise training program was well suited to healthy inactive older adults in twice-a-week participation. However without additional physical activity, there were no improvements in functional fitness (Stiggelbout, Popkema, Hopman-Rock, Greef & Mechelen, 2004). Some studies found similar results and concluded that participating in exercise programs only twice a week is not enough to improve functional fitness (Nakamura, Tanaka, Yabushita, Sakai & Shigematsu, 2007; Puggaard, 2003). Nonetheless, our study contradicts these conclusions as some improvements were shown in both programs with a twice or three times a week frequency.

Both groups experienced significant improvements in resistance of the upper limbs. However, the programs are different and our results can be influenced by one group over the other. That does not allow to say that an exercise program with land-based exercise plus aquatic-exercise group classes or a land-based exercise can produce effects at resistance of the upper limbs. Even so, the results are supported by a similar study where the intervention group experienced the same improvement (Taguchi, Higaki, Inoue, Kimura & Tanaka, 2010).

Because age-related differences influence hypertension, it is uncertain whether current exercise guidelines for reducing blood pressure are applicable to older people (Stewart et al., 2005). In the present study, there were decreases in mean values of SBP and DBP for both groups. Monteiro, Fiani, Freitas, Zanetti and Foss (2010) found significant decreases with 13 weeks of aerobic exercise training for DBP. Vianna et al. (2012) found similar decreases in DBP after 4 months of an exercise training programme that included walking, hydro, resistances exercises. Santa-Clara, Szymanski and Fernhall (2003) found significant reduces in SBP and DBP after 6 months of training that included cardiovascular machines. Cononi et al. (1991) reported the same changes with the same time. They applied a resistance and aerobic exercise training program. Some meta-analysis also reported significant reduces in SBP and DBP, despite the programs had different frequencies of training (Fagard, 2001; Kelley, 1999; Whelton, Chin, Chin & He, 2002).

Another significant/major finding in our study was the fact that no changes in anthropometric profiles were significant. This is supported by a study that concludes as major finding, the improvement of functional fitness and quality of life in obese older women after 12 weeks of water exercise was not paralleled with changes in anthropometric parameters (Rica et al., 2013). Some studies had significant changes in SBP and DBP, but none in anthropometric parameters (Cononi et al., 1991; Vianna et al., 2012; Whelton et al., 2002).

Other study states that dietary intake is an important factor for body composition. It is plausible to consider that the caloric cost of training might have been compensated by an increase in caloric intake (Gwinup, 1987) because no measure of nutritional diet was carried out in the study before (Rica et al., 2013).

Therefore, the optimization of caloric balance can be valuable for weight-reduction programs mainly based on exercise prescription (Rica et al., 2013). This was clear in a study where dietary restriction and exercise were controlled, and there was a satisfactory reduction of bodyweight (Gappmaier, Lake & Nelson, 2006).

According to the guidelines of ACSM (2013), to promote and maintain health, older adults should participate in moderate-intensity aerobic activity for at least 30 minutes on five days of the week, or vigorous-intensity aerobic activity for at least 20 minutes on three days of the week. The frequency of exercise classes in our study seemed to be insufficient to get improvements in anthropometric profiles. It is also known that the weight loss is more effective in older people when combined with a healthy diet and exercise (ACSM, 2013).

Detraining

The most relevant results emerging from this study were the fact that the enrollment on the exercise program of both groups led to significant effects after a detraining period in body fat (p=0.009), systolic (p=0.001), diastolic blood pressure (p=0.008), chair stand (p=0.000), agility (p=0.000), arm curl (p=0.000) and 6-min walk (p=0.001) tests by parametric statistic and in SFEC (p=0.002) and 10FL (p=0.001) test by non-parametric statistic, however there were few significant differences when comparing groups at detraining (6-min walk test, p=0.031) and that means despite both programs had different frequencies and program training, both promoted similar effect on measured variables. Therefore after 3 months of detraining, there were verified: decreases in SOL, weight, BMI, BF, CS, AC and MWT6; increases in AG, SBP, DBP and RHR, for both groups. G2 decreased SFEC. G1 decreased SUO.

Our results were in line with the study that found no differences between the baseline values and after detraining in blood pressure (Motoyama et al., 1998).

As well known, muscle strength plays an important role in gait performance. Teixeira-Samela *et al.* (2005) observed that the gains in gait speed (aerobic capacity) were lost after one month of detraining. This finding reinforces gait speed as a measure not only sensitive to training but also as an important predictor of functional independence for the elderly (Spirduso & Cronin, 2001). Our study revealed that after the detraining period, there were significant differences in aerobic capacity for both groups. The study of Woo, Leung and Kwok (2007) justifies this decreases by showing that older with BMI higher than 30 kg/m^2 had lower results when comparing with older with less than 30 kg/m^2. The results in our study were higher than 30 kg/m^2. Body fat also increased. Both parameters are directly related according to ACSM (2013).

Our study is reinforced by one other that evaluates the effects of six weeks detraining on functional fitness in young-old and old people, and age responses to detraining in elderly people living independently (Toraman & Ayceman, 2005). They found that age affected performance loss on the agility, 6-min walk, and chair sit and reach tests during the six weeks of detraining. This finding is in agreement with our study even in six weeks of detraining. In summary, the results of the study show that age does influence the changes in agility/dynamic balance, lower extremity flexibility and aerobic endurance during six weeks of detraining. However, six weeks of detraining does not reverse the gains in aerobic endurance and agility made during a nine week exercise programme in young-old (aged 60–73 years) adults and the gains in lower body strength of young-old and old (aged 74–86 years) people (Toraman & Ayceman, 2005). The findings of Toraman and Ayceman (2005) study support our study despite our results occurred in three months.

Despite of all results shown in this study, they could not be the same with a different assessment as stated by a previous study concluding the relation between some improvements and the specificity of the evaluation method (Carvalho et al., 2003).

The major limitations of this study were the sample size, the lack of control of daily living activities, lack of control group and lack of nutrient intake assessment. In addition, this study was part of a community delivery programme, in which the subjects were willing to participate and, therefore, were a self-selected group of highly motivated individuals. This may affect the generalization of the present findings to the general elderly population.

CONCLUSIONS

In summary, we concluded that the regular practice of land-based exercise or land-based exercise plus aquatic-exercise, both with multicomponent exercise training programs, twice or three times a week significantly improves functional capacity. The blood pressure values decreased in both exercise training programs.

On the other hand, we concluded that running a detraining period of three months after a regular practice of land-based exercise or a land-based exercise plus aquatic-exercise, significantly increases blood pressure levels while the variables of functional capacity significantly decreases.

Although subjects were instructed to maintain their normal dietary routines throughout the protocol period and to abstain from any dietary supplements, this was not strictly controlled. Further studies are thus needed in order to ascertain whether the observed changes were mostly due to exercise rather than due to other possible concurrent factors.

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