Effects of Different Types of Resistance Training and Detraining on Functional Capacity, Muscle Strength, and Power in Older Women: A Randomized Controlled Study

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Abstract

Filho, MM, Venturini, GRdO, Moreira, OC, Leitão, L, Mira, PA, Castro, JB, Aidar, FJ, Novaes, JdS, Vianna, JM, and Caputo Ferreira, ME. Effects of different types of resistance training and detraining on functional capacity, muscle strength, and power in older women: A randomized controlled study. *J Strength Cond Res* 36(4): 984–990, 2022—Resistance training (RT) increases muscle strength, power, and functional capacity (FC) of older women. However, these benefits can be lost partially or totally with detraining. This study aimed to compare the effect of 20 weeks of different types of RT and 4 weeks of detraining on muscle strength, power, and FC in older women. Ninety-five older women were randomly divided into 4 experimental groups (strength endurance, power, absolute strength, and relative strength training) and 1 control group (CG). We assessed muscle strength (10RM test) and muscle power of the lower (countermovement jump) and upper limbs (medicine ball pitch). Functional capacity was assessed by the Senior Fitness Test, which comprises the following tests: 30-second arm curl, 30-second chair stand, back scratch, chair sit and reach, 8-foot up and go, and 6-minute walk. The experiment lasted 24 weeks (familiarization: 2 weeks; neural adaptation: 6 weeks; specific training: 12 weeks; and detraining: 4 weeks). Muscle strength, lower and upper limb power (all $p < 0.05$), 30-second arm curl, 30-second chair stand, 8-foot up and go, 6-minute walk (all $p < 0.001$), and lower limb flexibility ($p = 0.002$) improved in all experimental groups after training and CG showed no differences in any of these variables. After detraining, muscle strength, lower and upper limb power ($p < 0.05$ for all), and FC decreased in comparison to the end of RT (30-second arm curl, 30-second chair stand, 8-foot up and go, 6-minute walk, and lower limb flexibility, $p < 0.05$ for all). Although the FC of the subjects has been reduced after 4 weeks of detraining, it was maintained at higher levels in comparison to baseline. These results suggested that older women can be submitted to different types of RT to achieve improvements in general fitness.

Key Words: older adults, strength training, functional status, exercise

Introduction

The aging process naturally reduces strength, power, and muscle mass and affects the functional capacity (FC) of older persons by decreasing balance, flexibility, agility, and aerobic capacity (1). This decline in FC leads older women to be less independent to perform activities of daily living (ADL) and more susceptible to comorbidities. Consequently, it increases the burden of non-communicable diseases (23). Several studies address intervention strategies that can improve FC that are clinically relevant to this population (10,23).

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In this context, resistance training (RT) programs are recommended by the guidelines of several traditional institutions (1,16,28). However, traditional RT (TRT) is focused on relative strength, overlooking other types of RT, such as strength endurance training (SET), power training (PWT), and absolute strength training (AST). Traditional resistance training focused on relative strength is found in most studies that usually suggest a volume of 8–12 repetitions, intensity between 60 and 80% of 1RM, and frequency of 2–3 times per week aiming to increase muscle strength and muscle mass (1). Strength endurance training consists of training with a light to moderate intensity (lower load percentage) with a higher number of repetitions (greater than 15) to be performed until fatigue without compromising the movement technique. Power training comprises performing the concentric phase of the movement at the highest possible speed, that is, to reach the highest amount of force in the shortest fraction of time; the intensity usually does not exceed 60% of the maximum load. Absolute strength training is characterized by the greater amount of strength that the neuromuscular system performs with few repetitions (no more than 6) and high intensity (1).

A short-term RT program can bring benefits to older people. This is what Pinto et al. (31) found when they observed the effects of a 6-week RT on muscle quality and FC of sedentary older women. However, the strength gains attributed to neural adaptations arising from training may extend for longer periods when considering the baseline of untrained older people, reaching approximately 21 weeks, as highlighted in the study by Deschennes and Kraemer (9). Thus, it is important that older women engage in and continue an RT program, aiming at more robust and lasting improvements on muscle strength and its additional benefits for performance in ADL.

The most recent guideline has suggested that PWT should be included in RT programs for older women (16). Moreover, middle-aged and older women, especially after menopause, tend to have greater hormones reductions than men, which causes a decline in muscle mass and strength (3).

Knowing the characteristics of each of these types of RT is important to enhance FC in older women because RT programs have a positive relationship with increased muscle strength and power, which directly affects FC improvement in this population (16). However, to the best of our knowledge, no study in the literature compared these different types of RT in a single investigation.

Furthermore, a characteristic of the older population is the partial or total interruption of physical exercise for different reasons (e.g., travel, illnesses, and falls), known as detraining (13,23). Detraining decreases or even reverses the physiological benefits obtained with RT on the components of physical fitness (muscle strength, cardiorespiratory capacity, flexibility, agility, speed, and balance, among others), which affects the FC of the older women (13,22,23,34). The magnitude of this decline depends on the physical fitness of the subjects and the length of the training interruption (23). It has been shown that just 1 month of detraining could negatively impact the benefits achieved with RT (27,37). In addition, so far, no study has assessed whether there is a specific type of RT that would lead to a slower reduction in FC after 1-month detraining.

Given the potential contribution of RT in increasing muscle strength, power, and FC, it is fundamental to analyze the chronic effect of different types of RT and detraining on these variables. Therefore, the present study aimed to compare the effect of 20 weeks of different types of RT (SET, PWT, AST, and TRT) and 4 weeks of detraining on muscle strength, power, and FC in older women.

Methods

Experimental Approach to the Problem

This is a randomized controlled trial. The procedures of this research were conducted according to the Consolidated Standards of Reporting Trials (CONSORT) criteria (25).

Eligible subjects were randomly assigned into 5 groups: SET, PWT, AST, TRT, and control group (CG). After randomization, subjects undertook 2 weeks of familiarization with RT. Then, they were submitted to data collection for the first time. After 6 weeks of adaptation to RT, the assessment of muscle strength, power, and FC was performed for the second time. Thereafter, subjects performed the RT or the control intervention for 12 weeks. Twenty-four hours after the last training session, data were obtained for the third time. Then, all experimental groups were asked not to perform regular exercise for 4 weeks (i.e., detraining), after which data collection was performed for the fourth time (Figure 1). The control group did not perform any systematic physical exercise program during the study period and was instructed to maintain their ADL as usual with frequent telephone calls to monitor their compliance. The interventions were conducted by instructors with experience in senior training. In view of the difficulty of blinding instructors and subjects in exercise trials, only the evaluation staff and statistical analyses were blinded to the exercise group assignment.

Subjects

One hundred and seventy older women were evaluated, of which 145 were included in the study and were divided into 5 groups (SET, PWT, AST, TRT, and CG) using a simple random sampling (Table 1).

Inclusion criteria were age between 60 and 75 years, being physically independent in ADL, not participating in another systematic physical exercise program, and having no previous experience with RT. Exclusion criteria were subjects with musculoskeletal limitations who contraindicated the practice of programmed exercises, clinical diagnosis of uncontrolled arterial hypertension or diabetes, and use of ergogenic resources or hormone replacement. Moreover, for the final data analysis, we excluded the older women who had adherence below 75% of the sessions provided by the program (Figure 2).

The study protocol was approved by the Research Ethics Committee of the Federal University of Juiz de Fora, Minas Gerais, Brazil (protocol number 2.887.652), and was in accordance with the Declaration of Helsinki and the Resolution 466/12 of the Brazilian National Health Council. All subjects signed a written informed consent form before being included in the study.

Procedures

Anthropometric Measures. Body mass and height were measured using a mechanical scale (Filizola, Brazil), 100 g precision, and 150 kg capacity, with a stadiometer (Sanny, Brazil), precision of 0.1 cm. All measurements were performed according to the International Standards for Anthropometric Assessment (ISAK) protocol (24).

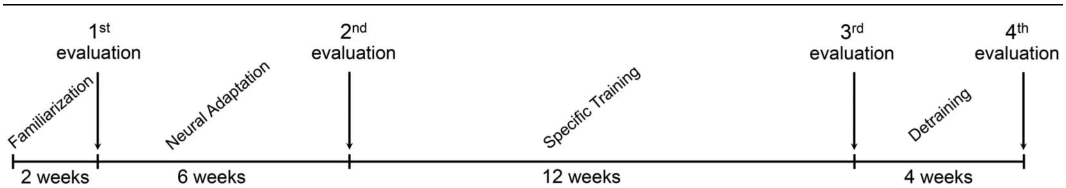

Figure 1. Experimental design.

Table 1
Subjects' characteristics at baseline (mean ± *SD*).*

Variables	SET (*n* = 20)	PWT (*n* = 18)	TRT (*n* = 17)	AST (*n* = 21)	CG (*n* = 19)
Age (y)	65 ± 4	66 ± 4	67 ± 4	66 ± 5	68 ± 5
Height (m)	1.54 ± 0.05	1.57 ± 0.05	1.55 ± 0.07	1.57 ± 0.05	1.56 ± 0.06
Body mass (kg)	70.00 ± 14.09	71.00 ± 14.58	60.59 ± 10.26	73.91 ± 13.07	67.88 ± 11.32
BMI ($kg \cdot m^{-2}$)	29.17 ± 5.30	28.79 ± 5.39	25.49 ± 4.60	30.19 ± 5.54	28.15 ± 5.21

*BMI = body mass index; SET = strength endurance training; PWT = power training; TRT = traditional training; AST = absolute strength training; CG = control group.

Evaluation of Muscle Strength and Training Load Control. The test of 10-repetition maximum (10RM) was performed to assess muscle strength (35). Training load was adjusted using the rating of perceived exertion (RPE), which was assessed by the OMNI-RES scale (21). We adopted the values of RPE from 5 to 7 in the first 8 weeks (i.e., familiarization and adaptation) and from 6 to 8 in the following 12 weeks (i.e., specific intervention).

Functional Capacity Testing Battery. The Senior Fitness Test was used to assess the FC (33). This protocol comprises 6 tests: upper limb strength (30-second arm curl), lower limb strength (30-second chair stand), upper limb flexibility (back scratch), lower limb flexibility (chair sit and reach), agility/dynamic balance (8-foot up and go), and aerobic capacity (6-minute walk).

Power Test of Upper and Lower Limbs. To assess the power of upper limb throwing, a medicine ball test was used. The test was performed with the older woman seated on a chair, feet flat on the floor, and back against the back of the chair and with a 2 kg medicine ball. The medicine ball was positioned as close to the chest as possible, keeping the elbows flexed and shoulders abducted at 90°. After a verbal command, the older woman threw the medicine ball forward using both hands. The goal was to reach the longer distance as possible. The first throw was for familiarization. After that, an interval of 2 minutes was given for the beginning of the evaluation. The distance thrown was considered between the base of the chair until the point that the medicine ball touched the ground for the first time. Three attempts were made, and the best result was recorded (17).

The power of the lower limbs was evaluated by countermovement jump (4), in which the vertical jump was recorded by a force platform (Cefise, model Jump System Pro) and was analyzed using specific software (Jump System version 1.0.2.9).

Training Program. The training program consisted of the following exercises performed twice a week: horizontal leg press, low row, flexor chair, articulated bench press, plantar flexion, and curl-ups. All experimental groups followed the same standardization regarding the training system, exercise order, recovery interval, volume of repetitions, and weekly frequency.

During the familiarization period, 2 sets of 15 repetitions were performed, with intensity between 50 and 60% of 10RM, and a 1-minute interval elapsed between sets and exercises. Subsequently, an adaptation period of 6 weeks was performed. For this, the subjects performed 3 sets of 12–15 repetitions, with an intensity of 60% of 10RM, and intervals of 1 minute between sets and 2 minutes between exercises. Thereafter, older women were submitted to specific interventions (SET, PWT, AST, and TRT). The experimental groups had the training intensity controlled by the RPE, which ranged between 6 and 8 points, as suggested by Tiggemann et al. (38). In the PWT, the intensity was 50% of 10RM with maximum velocity of execution in the concentric phase.

The strength endurance training group performed 1 set of 20–25 repetitions; the AST group performed 4–5 sets of 4–5 repetitions; the TRT group performed 2–3 sets with repetitions varying between 8 and 12; and the PWT group performed 2–3 sets with 8–12 repetitions. All groups performed between 20 and 25 repetitions in each exercise. Such exercise prescription was done aiming to equalize the total number of repetitions that the groups would perform in each training session.

A 3-minute interval elapsed between sets and exercises for all interventions. The muscle contraction cycle was controlled by a

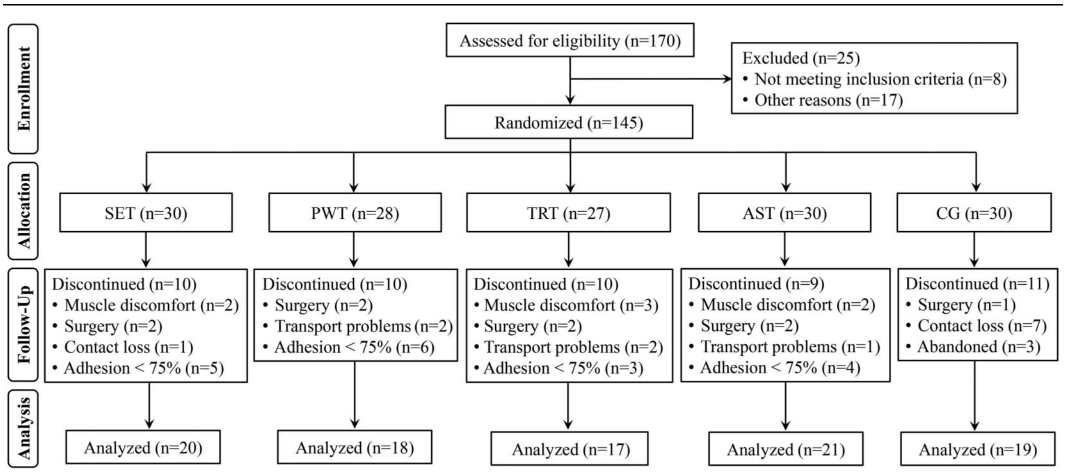

Figure 2. Flow diagram according to CONSORT. SET = strength endurance training; PWT = power training; TRT = traditional training; AST = absolute strength training; CG = control group.

metronome, in which concentric and eccentric phases lasted for 2 seconds (i.e., totalizing 4 seconds each cycle) for the SET, AST, and TRT groups. By design, the PWT group worked out at maximum velocity in the concentric phase of the exercise. The load progression ranged from 5 to 10% every 2 weeks (20). None of the groups underwent training until concentric failure.

Detraining. After the evaluations of the training period, the older women were instructed not to perform systematic physical exercises for 4 weeks and maintain their dietary daily routine. During this period, they were monitored weekly by telephone contact.

Statistical Analyses

The results were presented as mean ± *SD*. The effect size was assessed by the partial eta^2, in which the cutoff points 0.01, 0.06, and 0.14 were considered small, moderate, and large, respectively (7). The Shapiro-Wilk and Levene's tests were used to verify the assumptions of normal distribution and homoscedasticity, respectively. We used the repeated-measures 5 × 4 ANOVA, followed by Bonferroni post hoc, to test the training effect on dependent variables. To check sphericity, the Mauchly's test was used. When sphericity was violated, Huynh-Feldt correction was used. All analyses were performed using SPSS version 20.0 (IBM Corp., Armonk, NY). The significance level was set at 5%. The sample calculation was performed using the G*Power 3.1 program, where the largest sample size generated was considered to test the main and interaction effects. Considering medium effect size, 80% of power, and 5% of significance level, a sample of 100 older women would be necessary, 20 in each group.

Results

All experimental groups, compared with baseline and intervention periods, had significant improvements in the following FC tests: 30-second arm curl, 30-second chair stand, chair sit and reach, 8-foot up and go, and 6-minute walk ($p < 0.05$). The exception was the back scratch, which had no significant improvements regardless of the training group or time of measurement (Figure 3). In the 10RM and power tests, all groups submitted to RT had a significant increase in muscle strength compared with the CG across test periods. In addition, the increase of muscle strength in AST and PWT groups was higher than the other 2 groups of RT.

It was also possible to observe significant decreases in all groups after the detraining period. These 4 weeks of detraining resulted in a decrease of muscle strength in the proposed exercises in all training configurations, although muscle strength remained with values above the pretest and without differences for the eighth week of training. The period of only 4 weeks of detraining caused losses in power, however smaller than the gains obtained in 20 weeks of training. The 1-month detraining promoted significant reductions in adaptations gained, regardless of the type of RT adopted, but was not enough to return earnings to baseline (Figure 3).

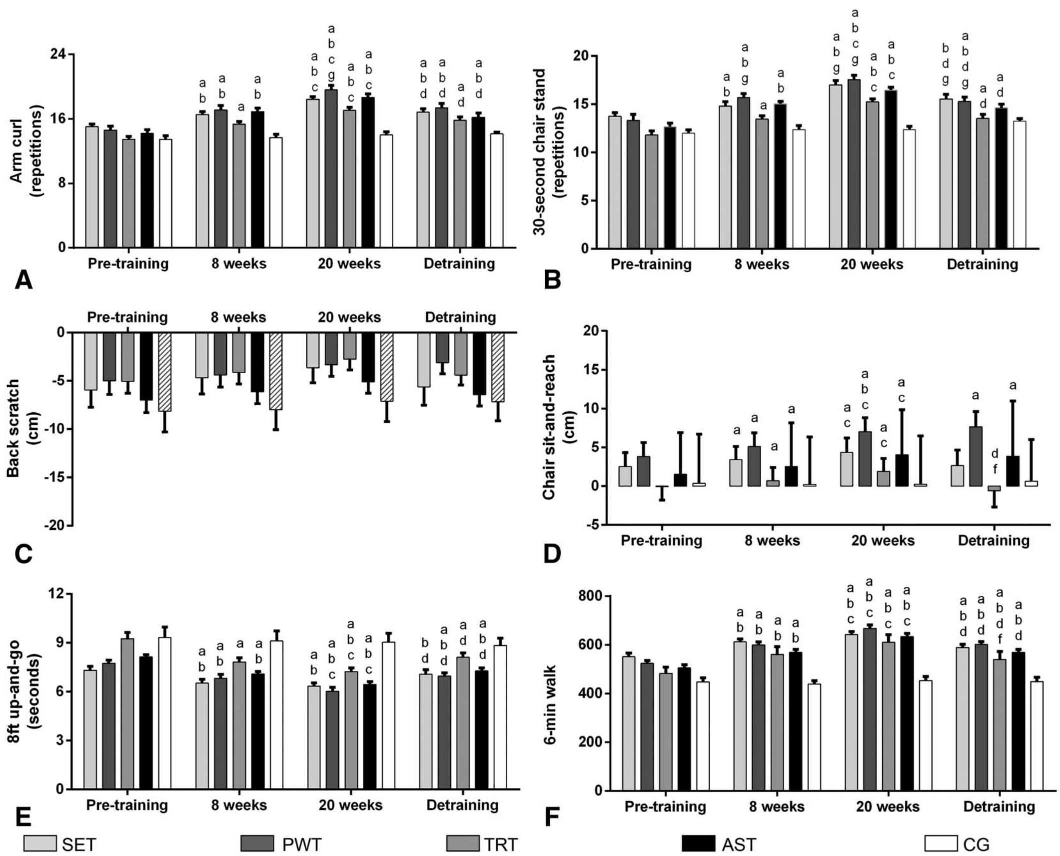

Figure 3. Functional capacity outcomes. A) Upper-body strength; (B) lower-body strength; (C) upper-body flexibility; (D) lower-body flexibility; (E) agility/dynamic balance; (F) aerobic endurance. $^a p < 0.05$ vs. pretraining; $^b p < 0.05$ vs. CG; $^c p < 0.05$ vs. 8 weeks; $^d p < 0.05$ vs. 20 weeks; $^e p < 0.05$ vs. AST; $^f p < 0.05$ vs. PWT, $^g p < 0.05$ vs. TRT. SET = strength endurance training; PWT = power training; TRT = traditional training; AST = absolute strength training; CG = control group.

The power of the lower limbs (Table 2) increased after 8 weeks of training in all intervention groups; a significant difference was observed in relation to CG (effect size: $\eta^2 = 0.139$). After detraining, all intervention groups showed a significant reduction when compared with the end of training (20 weeks). However, SET and AST groups maintained levels higher than those found at pretraining. Only the SET group increased the power of the upper limbs in the eighth week in relation to the pretraining, reaching values higher than the CG. After 20 weeks of training, all intervention groups showed significant gains, with the values of the power and absolute strength groups being greater than the CG (effect size: $\eta^2 = 0.098$). The older women in the PWT, AST, and TRT groups showed a significant reduction after detraining when compared with the results obtained after 20 weeks. However, the PWT and AST groups maintained values higher than the pretraining.

Muscle strength showed a significant increase after the proposed intervention in all groups undergoing RT, regardless of the training procedure, when compared with the CG across test periods (8 and 20 weeks of training) (Table 3) and great effects in 3 exercises: seated low row ($\eta^2 = 0.36$), leg press ($\eta^2 = 0.40$), and leg curl ($\eta^2 = 0.384$). The chest press exercise had a medium effect ($\eta^2 = 0.133$).

The AST group showed more pronounced strength gains when compared with the TRT group at 8 and 20 weeks of training. The PWT group stood out in relation to the SET and TRT groups at the end of the intervention, reinforcing the effectiveness of this training configuration aimed at developing muscle strength. Muscle strength declined in all groups after 4 weeks of detraining but remained higher compared with baseline and after 8 weeks of training.

Discussion

This study aimed to compare the effects of 20-week different types of RT programs and 4 weeks of detraining on muscle strength, power, and FC in older women. The main results were as follows: (a) older women increase their FC after an RT program regardless of the type of RT; (b) at the end of the training period (20 weeks), it was possible to identify that the AST and PWT groups improved more than the others, which leads us to believe that the variables load and speed could receive special attention in RT planning; and (c) reductions in FC were observed in all groups after detraining, showing the importance of maintaining the practice of RT. However, 4 weeks of detraining were not enough to reverse the benefits gained with 20 weeks of training.

The present study suggests that, at least in part, the improvement in FC can be explained by the increase in muscle strength and power. There is a consensus that the increase in muscle strength and power after RT can be explained by neural adaptations (26). Deschennes and Kraemer (9) suggest that in sedentary older women, neural adaptations can last for up to 21 weeks, a time similar to the training program of our study. Thus, the increase in muscle strength and power would occur due to improved coordination, in the application of tension, either by optimizing the recruitment of motor units or by inhibiting antagonistic muscles and the Golgi tendon organ (14).

Although all types of RT were shown to be efficient, the AST and PWT groups showed better results. This result can be explained by the particular characteristics of the training techniques, where muscle strength tends to be maximized in more intense workouts due to the greater recruitment and synchronization of motor units (19). Adaptations related to muscle PWT may be better transferred to ADL, improving FC (40). Hence, along with muscle strength, PWT should be considered an important strategy that may produce greater improvements in the FC of elderly women (5).

Previous studies have shown that older individuals who engage in RT have improved their flexibility (8), agility, dynamic balance, walking speed (6,32,39), and maximum aerobic capacity (12,18), which is in accordance with the present study. Furthermore, our study showed that FC improved after all 4 types of RT (SET, PWT, AST, and TRT). Tiggemann et al. (38) found no significant differences when comparing the effects of traditional training versus PWT in older women. Also, Pereira et al. (30) reported benefits after 12 weeks of training in PWT versus traditional training interventions, but with an emphasis on the power group, revealing the importance of speed in training prescriptions for older people (29). Taken together, these results suggest that, regardless of the type of RT, older persons must participate in

Table 2

Effects of the different training programs on the skeletal muscle power of the upper and lower limbs (mean ± *SD*).*

Exercise	Pretraining	8 wk	20 wk	Detraining
Countermovement jump (cm)				
PWT	7.26 ± 0.51†	9.00 ± 0.57†‡	9.80 ± 0.64†‡	8.11 ± 0.49†§
TRT	5.32 ± 0.62	6.35 ± 0.64‡‖	7.12 ± 0.72‡‖	6.16 ± 0.65§
SET	5.78 ± 0.68	7.50 ± 0.72†‡	8.97 ± 0.66†‡¶	7.92 ± 0.53†‡§
AST	6.37 ± 0.53†	8.19 ± 0.45†‡	9.33 ± 0.58†‡¶	8.02 ± 0.54†‡§
CG	4.08 ± 0.37	5.05 ± 0.52	4.71 ± 0.43	4.90 ± 0.43
Medicine ball throw (m)				
PWT	2.29 ± 0.12	2.44 ± 0.15	2.84 ± 0.12†‡¶	2.52 ± 0.11†‡§
TRT	1.96 ± 0.08	2.18 ± 0.10	2.28 ± 0.10‡	2.06 ± 0.10§
SET	2.14 ± 0.07	2.45 ± 0.11†‡	2.48 ± 0.10‡	2.33 ± 0.09
AST	2.26 ± 0.07	2.43 ± 0.11	2.75 ± 0.11†‡¶	2.48 ± 0.09†‡§
CG	2.03 ± 0.08	2.00 ± 0.08	2.12 ± 0.09	2.03 ± 0.07

*PWT = power training; TRT = traditional training; SET = strength endurance training; AST = absolute strength training; CG = control group.
†$p < 0.05$ vs. CG.
‡$p < 0.05$ vs. pretraining.
§$p < 0.05$ vs. 20 wk.
‖$p < 0.05$ vs. PWT.
¶$p < 0.05$ vs. 8 wk.

Table 3

Effects of the different training programs on the skeletal muscle force in lower- and upper-body exercises.*†

Exercise	Pretraining	8 wk	20 wk	Detraining
Leg press (kg)				
PWT	62.50 ± 2.26‡	88.61 ± 2.61‡§	108.61 ± 4.69‡§‖	98.06 ± 3.60‡§¶
TRT	56.18 ± 2.76#	78.24 ± 3.37‡§#	97.35 ± 5.17‡§‖#	87.94 ± 4.05‡§¶#
SET	62.75 ± 2.68‡	81.00 ± 2.61‡§	92.25 ± 3.93‡§‖#	90.25 ± 3.76‡§#
AST	66.90 ± 2.35‡	89.52 ± 2.63‡§	119.05 ± 4.08‡§‖	104.05 ± 2.48‡§¶
CG	50.79 ± 2.68	51.84 ± 2.74	48.58 ± 3.56	55.26 ± 2.40
Leg curl (kg)				
PWT	16.44 ± 0.80	24.67 ± 1.44‡§	31.83 ± 1.78‡§‖	26.44 ± 1.30‡§¶
TRT	16.06 ± 0.67	21.18 ± 1.26‡§	26.71 ± 1.62‡§‖	22.00 ± 1.45‡§¶
SET	17.05 ± 0.68	22.10 ± 1.44‡§	25.65 ± 1.43‡§‖**	23.60 ± 1.23‡§
AST	17.48 ± 0.75	24.67 ± 1.10‡§	30.67 ± 1.45‡§‖	25.43 ± 0.94‡§¶
CG	16.58 ± 0.92	15.26 ± 0.70	14.84 ± 0.63	15.21 ± 0.64
Chest press (kg)				
PWT	12.89 ± 0.67‡	17.11 ± 0.93‡§	19.78 ± 1.13‡§	15.83 ± 0.66‡§¶
TRT	11.65 ± 0.49#	14.12 ± 0.61‡§#	16.41 ± 0.59‡§#	13.41 ± 0.54‡#
SET	12.70 ± 0.47‡	17.00 ± 0.95‡§	18.00 ± 0.73‡§	15.30 ± 0.64‡§
AST	14.43 ± 0.49‡	18.33 ± 0.53‡§	22.24 ± 1.01‡§‖	17.33 ± 0.52‡§¶
CG	10.16 ± 0.89	9.47 ± 0.71	11.00 ± 1.96	10.63 ± 0.53
Seated low row (kg)				
PWT	16.44 ± 0.53	24.17 ± 1.35‡§	31.00 ± 1.56‡§‖	27.33 ± 1.36‡§¶
TRT	15.12 ± 1.00#	20.29 ± 1.50§#	25.76 ± 1.56‡§‖#	22.71 ± 1.13‡§¶**
SET	18.05 ± 1.16	22.60 ± 0.98‡§	27.25 ± 0.99‡§‖	22.80 ± 0.86‡§¶**
AST	18.76 ± 0.85	26.38 ± 0.95‡§	31.10 ± 1.39‡§‖	26.00 ± 1.14‡§¶
CG	16.84 ± 0.71	16.63 ± 0.75	14.79 ± 0.67	14.95 ± 0.67

*PWT = power training; TRT = traditional training; SET = strength endurance training; AST = absolute strength training; CG = control group.
†Data are presented as mean ± *SE*.
‡$p < 0.05$ vs. CG.
§$p < 0.05$ vs. pretraining.
‖$p < 0.05$ vs. 8 wk.
¶$p < 0.05$ vs. 20 wk.
#$p < 0.05$ vs. AST.
**$p < 0.05$ vs. PWT.

progressive RT programs continuously to obtain improvements in FC, which may have a direct impact on improving the performance of ADL.

At the end of the detraining period, FC decreased. However, all groups maintained the FC above the baseline values. The FC reduction after detraining was reported previously by other studies (22,23,30,34). These data reinforce that, regardless of the type of RT, the continuity of training should be maintained whenever possible throughout life. In addition, several studies have shown that physical training at a higher intensity promotes better adaptations and preserves gains in muscle strength and power after a period of detraining (2,11,15,36). This highlights the need to prescribe intense training within a training plan for older persons.

The present study had some limitations: (a) we did not control the nutritional habits of the subjects and (b) the absence of older men or women over 75 years. These limitations can prevent the possibility of extrapolating the results obtained to other groups with different characteristics from our sample. A strength of the present study is its ecological validity because the resources used to assess FC and prescribe RT for older people can be found in most gyms with a basic structure.

All types of RT (SET, PWT, AST, and TRT) were efficient in improving the FC of older women by the increase in muscle strength and power. Although the muscle strength, muscle power, and FC of the subjects have been reduced after 4 weeks of detraining, it was maintained at higher levels in comparison to baseline. These results reinforce the importance of RT programs for elderly women and the importance of long-term training. We highlight the need for a careful look at the planning of these training programs to distribute the different types of RT properly and promote the various manifestations of muscle strength and power. Consequently, the maintenance or improvement of FC in older people can enable greater possibilities to perform diverse ADL, such as carrying bags, picking up their grandchildren in their lap, washing the dishes without help, going up and down steps, and walking around the house and in different places.

Practical Applications

Based on our results, it is suggested that older women can be submitted to different types of RT, not being restricted to the traditional training established by the traditional guidelines of the American College of Sports Medicine (1), the Brazilian Society of Sports Medicine, and the Brazilian Society of Geriatrics and Gerontology (28). Moreover, associating basic exercises at the beginning of the series aiming at the development of absolute strength and power followed by traditional training or strength endurance can be an interesting strategy to improve FC.

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