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COMPARATIVE STUDY

Comparison of the effect of different modalities of physical exercise on functionality and anthropometric measurements in community-dwelling older women

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Summary The present study aims to assess the effect of different modalities of physical exercises ("Functional Gymnastics"—FG, "Resistance Training"—RT and "Pilates combined with Hydrogymnastics"—PCH) on functional capacity and anthropometric measurements of 148 older women (60 years old or more). A comparative observational study was conducted. Functional and anthropometric measurements were assessed at baseline and after 16 weeks. All groups assessed showed significant changes between baseline and post-training. On the comparison of pre and post-training, differences in anthropometric measurements but not in functional test performance were found. The PCH had greater weight loss compared to the FG and RT, reduction in BMI compared to the FG and RT; reduction in waist compared to the FG and RT, and in hip compared to the RT. Although all groups improved, Pilates/Hydrogymnastics combination was more strongly associated with reductions in weight, BMI, waist and hip measurements but not functionality, than other modalities. These results highlight the role of combination physical exercise training in older women.

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Introduction

In recent decades, there has been a major demographic transition characterized by a sharp rise in the number of older adults (60 years old or more), a group which currently represents 10.4% of the Brazilian population (IBGE, 2012). As a result of the aging process, older adults undergo a number of physiological changes such as impairments in sensory, cardiorespiratory, neurologic and osteomioarticular systems, with the latter greatly exacerbated by physical inactivity (Toledo and Barela, 2010).

The decline in muscular strength and joint flexibility impact functional performance of tasks requiring motor coordination and balance (Lajoie and Gallagher, 2004), including activities of daily living (using public transport, carrying shopping etc.), which can be easily compromised, hampering the maintenance of a healthy life style (Artero et al., 2011; Gale et al., 2007). This decline can also be associated with a higher prevalence of falls and morbimortality (Feder et al., 2000).

In this context, many studies have been published involving programs aimed at improving balance, cardiorespiratory function, power and muscle strength in older adults through the practice of physical exercises (Fatouros et al., 2005; Resende and Rassi, 2008). The results have shown the beneficial effects of physical exercise on cardiac and neuromuscular function as well as on functional autonomy and general functional fitness (Konopack et al., 2008; Rikli and Jones, 1999).

Currently, although a range of different options of practicing physical activities are available to older adults, certain practices have proved highly popular, such as Gymnastics, Muscle Strength Training, the Pilates Method and Hydrogymnastics.

However, few studies have assessed the effect of different modalities of physical exercise in a physical activity program for older adults (Fatouros et al., 2005; Grabiner et al., 2014; Iliffe et al., 2010; Lajoie and Gallagher, 2004; Mcdermott and Mernitz, 2006). Recently, Giné-Garriga et al. (2014) conducted a meta-analysis showing the beneficial effect of physical exercises on the physical function of frail adults and pointed to a dearth of studies comparing these different modalities.

Therefore, the aim of the present study was to assess the effect of different modalities of physical exercises ("Functional Gymnastics", "Resistance Training" and "Pilates combined with Hydrogymnastics") on functional capacity and anthropometric measurements in older women.

Methods

A comparative observational study of older adults enrolled on an active aging program (FaMIdade — "Faculdade Aberta a Melhor Idade", of the Methodist Granbery School) in the city of Juiz de Fora (Brazil) was conducted between February and July 2014.

The FaMIdade is a university extension program whose objective is to promote education and health, preparing older adults for an active life. To this end, it runs cognitive and physical (exercises) activities, stimulating social interaction and enhancing quality of life.

The criteria for inclusion in the study were being female, aged 60—100 years, enrolled in the activities of the FaMIdade and having medical approval and status to take part in the physical activities. Individuals who dropped out of the program, attended less than 75% of the training sessions in the current program or did not wish to take part in the study were excluded. Older adults presenting with osteomioarticular problems, patients who had undergone surgical revascularization procedures, individuals in use of betablockers, with uncontrolled diabetes and hypertension or diseases preventing them from performing the physical exercise were also excluded.

The objectives of the study were explained and after signing the informed consent form, groups were defined based on self-preferences and availability of places on the program. Participants were divided into the following groups:

- Strength Training (RT — Resistance Training): The protocol of exercises comprised interventions of maximum load test of 10 repetition maximums (RM), assessed by the OMNI-Perceived Exertion scale for Resistance Exercise (OMNI-RES) for seated leg extension, lateral raise, and seated abductor exercises. After the load test period, subjects were submitted to the Strength Training with the session prescribed in a circuit training format — indicated for health (Medicine, 2013; Williams et al., 2007), entailing three circuits with thirty-second intervals between exercises (Medicine, 2013), repetition range of between eight to ten and initial load corresponding to 70% of the 10-RM test on the exercises assessed. The OMNI-RES was applied to adjust the training loads, because some studies suggest that OMNI-RES could be ideally used in resistance activities (Lagally and Robertson, 2006). The following exercise machines were used: leg press, front pulls on high pulley, seated leg extension, pec deck/chest fly, seated abductor, lateral raise, plantar flexion (heel lift) and triceps on pulley. The training started with a period of 10 min of stretching and flexibility exercises of upper and lower limbs; a phase for strengthening musculature for 40 min; and 10 min of rest.
- Functional Gymnastics (FG): Participants were submitted to prescribed physical resistance and strength exercises for lower and upper limbs which consisted of exercises using free weights (Raso and Greve, 2012). The training was organized in a circuit format with rest periods (Williams et al., 2007), in two sets of ten repetitions with moderate load and passive rest of 1 min between sets, where level of intensity was based on the Rating of Perceived Exertion — Borg (Borg, 1982), since this is a circuit format with aerobic characteristics (heart rate could change dynamically according to the proposed exercise). The exercises were performed in a split routine alternating by segment so as to prevent overload and ensure only one joint was exercised at a time. Training sessions included exercises such as: squats with support, unilateral squats, hip adduction and abduction, calves, hip flexor, alternating curls, development, French triceps