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Research Article

Water aerobics is followed by short-time and immediate systolic blood pressure reduction in overweight and obese hypertensive women

Raphael Martins Cunha, MSc[a], Gisela Arsa[b], Eduardo Borba Neves[c], Lorena Curado Lopes, MSc[d], Fabio Santana[d], Marcelo Vasconcelos Noleto[d], Thais I. Rolim[d], and Alexandre Machado Lehnen, PhD[a,*]

[a]*Institute of Cardiology/University Foundation of Cardiology, Rio Grande do Sul, Brazil;*
[b]*Faculty of Physical Education, Federal University of Mato Grosso, Mato Grosso, Brazil;*
[c]*Brazilian Army Research Institute of Physical Fitness, Rio de Janeiro, Brazil; and*
[d]*Exercise Physiology Laboratory, State University of Goiás, Goiás, Brazil*

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Abstract

One exercise training session such as walking, running, and resistance can lead to a decrease in blood pressure in normotensive and hypertensive individuals, but few studies have investigated the effects of exercise training in an aquatic environment for overweight and obese hypertensive individuals. We aimed to assess the acute effects of a water aerobics session on blood pressure changes in pharmacologically treated overweight and obese hypertensive women. A randomized crossover study was carried out with 18 hypertensive women, 10 of them were overweight (54.4 ± 7.9 years; body mass index: 27.8 ± 1.7 kg/m^2) and eight obese (56.4 ± 6.6 years; body mass index: 33.0 ± 2.0 kg/m^2). The water aerobics exercise session consisted of a 45-minute training at the intensity of 70%–75% of maximum heart rate adjusted for the aquatic environment. The control group did not enter the pool and did not perform any exercise. We measured systolic blood pressure (SBP) and diastolic blood pressure (DBP) before, immediately after, and every 10 minutes up to 30 minutes after the aerobic exercise or control session. Overall (n = 18), DBP did not change after the water aerobic exercise and control session, and SBP decreased at 10 and 20 minutes postexercise compared to the control session. Among overweight women, SBP decreased at 10 and 20 minutes postexercise. In contrast, among obese women, SBP decreased only at 10 minutes postexercise. SBP variation was −2.68 mm Hg in overweight and −1.24 mm Hg in obese women. In conclusion, the water aerobics session leads to a reduction in SBP, but not in DBP, during 10 and 20 minutes postexercise recovery. Thus, it may be safely prescribed to overweight and obese women. J Am Soc Hypertens 2016;10(7):570–577. © 2016 American Society of Hypertension. All rights reserved.

Keywords: Hypertension; postexercise hypotension; water aerobic exercise.

Introduction

Systemic arterial hypertension is a continuous linear independent risk factor for several cardiovascular conditions, and it is associated with a 40% mortality from stroke and 25% from coronary artery disease.[1] In Brazil, the prevalence of hypertension is 68% among the elderly, which is quite similar to that reported in other countries such as the United States (71%),[2] Japan (60%),[3] South Korea (69%),[4] and Portugal (78%).[5] Global estimates show that high blood pressure (BP) rates are higher among men up to 50 years old and among women older than 50 years,[6] especially in postmenopausal women.[7,8]

Regular exercise is a well-established intervention for the prevention and treatment of hypertension.[9,10] In particular, aerobic exercise has hemodynamic benefits.[10] Evidence shows that a single aerobic exercise session can lead to BP reduction during the recovery period when compared to preexercise.[11–13] Postexercise hypotension (PEH) is a physiological phenomenon that occurs for hours after exercise.[14]

Conflict of interest: None.

*Corresponding author: Alexandre Machado Lehnen, PhD, Instituto de Cardiologia do Rio Grande do Sul/Fundação Universitária de Cardiologia, Unidade de Pesquisa, 3°Andar, Av. Princesa Isabel, 395 Santana, 90620-001 Porto Alegre, RS, Brazil. Tel: +55(51)3230.3600x3636; Fax: +55(51)3230.3600x3637.

E-mail: amlehnen@gmail.com

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The magnitude and duration of the decline in BP vary depending on the type and intensity of exercise (Wallace et al. 1997). Furthermore, PEH is more pronounced and lasts longer in those with higher resting BP levels (Cardoso et al. 2010). Its occurrence has been associated with a decrease in cardiac output and/or systemic vascular resistance[15] and may be accompanied by a decrease in peripheral sympathetic activity,[15,16] and these mechanisms may be different in men and women.[17]

Water exercise training is recommended for body weight reduction as it promotes high energy expenditure and has cardiovascular benefits and lower risk of joint injuries.[18,19] PEH after exercise on land is well documented, but evidence of PEH after exercise in water is still scarce. Exercise in water has different acute hemodynamic responses compared to exercise on land.[20] The immersion in water produces changes in hydrostatic pressure that results in increased venous return increasing stroke volume and cardiac output, producing reflex bradycardiam,[21,22] and suppressing the renin–angiotensin–aldosterone system.[23] Water aerobic exercise may have different effects on BP; it has been shown to decrease,[24] not change,[20] and increase immediately after exercise[25] compared to preexercise levels.

Obesity is a major cause of increased BP[26] because of increased sympathetic nervous activity and higher peripheral vascular resistance.[27] Thereby, water exercises seems appropriate to be prescribed to this population as it has a lower risk of injuries and fall and may lead to BP reduction postexercise. Because PEH term is a physiological phenomenon that occurs for hours after exercise and we considered only a short-time analysis (up to 30 minutes), we prefer to use the "BP reduction immediately postexercise" term in our study. In this sense, there are scarce studies evaluating changes in BP in overweight and obese hypertensive individuals after water aerobic exercises, in particular, immediately postexercise.

This study aimed to assess whether a single water aerobics session can result a BP reduction immediately postexercise in pharmacologically treated overweight and obese hypertensive women and, additionally, whether the acute effects of this form of exercise make it hemodynamically safe to prescribe for this population.

Material and Methods

A randomized crossover study was conducted at an aquatic center and an exercise physiology laboratory. This research project followed the principles of the Declaration of Helsinki and was approved by the local research ethics committee (protocol number 243.853/2013) and Instituto de Cardiologia do Rio Grande do Sul/Fundação Universitária de Cardiologia (protocol number 4932/2013). All participants signed an informed consent form before participating in the study.

Study Sample and Group Assignment

Figure 1 illustrates the study design. Twenty-three hypertensive adult women enrolled in a water exercise program at a local aquatic center were invited to participate in the study. Of these, two refused to participate for personal reasons. Therefore, 21 women were evaluated according to the study inclusion/exclusion criteria.

The inclusion criteria were age between 40 and 65 years; use of antihypertensive drugs; systolic blood pressure

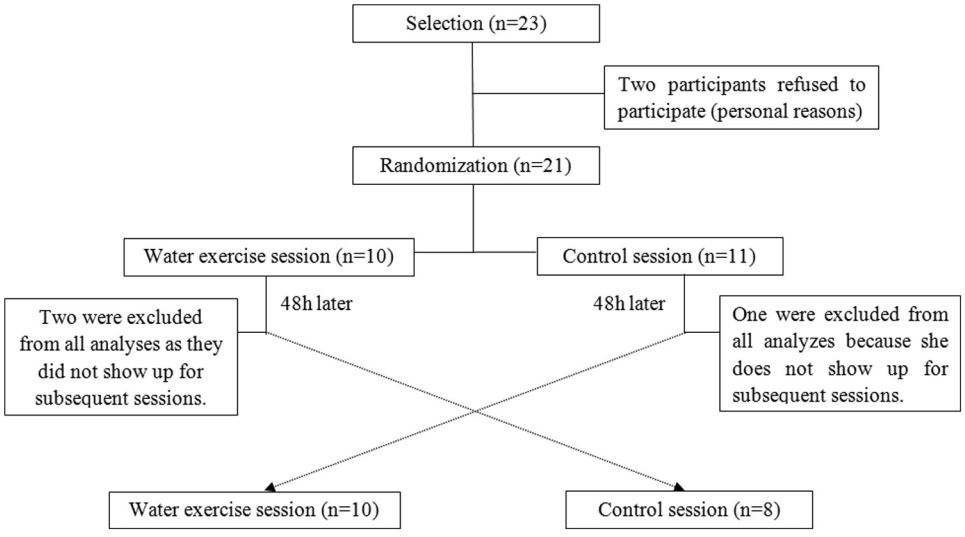

Figure 1. Design of the study. Twenty-three hypertensive women were invited to participate in the study. Two participants refused to participate for personal reasons. Twenty-one participants were evaluated for the inclusion/exclusion criteria and randomized into water exercise or control groups. After the first sessions, three participants were excluded as they did not show up for subsequent sessions. Thus, 18 hypertensive women completed the study. In addition, they were stratified by body mass index into overweight or obese groups.

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