

Research Article

Effects of aerobic dance training on blood pressure in individuals with uncontrolled hypertension on two antihypertensive drugs: a randomized clinical trial



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Manuscript received November 20, 2015 and accepted February 3, 2016

Abstract

There is a dearth of reports on possible additive blood pressure (BP)–reducing effect of aerobic exercise on antihypertensive drug in humans. This study investigated the additive BP-reducing effect of aerobic exercise on BP in individuals with uncontrolled hypertension. In this 12-week double-blind study, 120 new-diagnosed individuals with mild-to-moderate hypertension were randomized to receive coamilofide + 5/10 mg of amlodipine + aerobic dance or coamilofide + 5/10 mg of amlodipine alone. Forty-five and 43 participants in exercise and control groups, respectively, completed the 12-week intervention. Addition of aerobic exercise to antihypertensive drug therapy significantly reduced systolic BP (7.1 mm Hg [95% confidence interval: 5.0, 9.3]; $P < .001$) and diastolic BP (1.7 mm Hg [95% confidence interval: 0.4, 3.0]; $P = .009$) at 12 weeks. BP control rate differed significantly between exercise (53.9%) and control (35.3%) groups, $P < .001$. Postintervention, proportion of participants in exercise group who had their number of antihypertensive drug reduced to one (20.3%) differed from that in control group (11.1%); ($\chi^2 = 11.0$; $P = .001$). Combination of aerobic dance and antihypertensive drugs reduces number of antihypertensive drugs needed to achieve BP control and enhances BP control in individuals with hypertension on two antihypertensive drugs. *J Am Soc Hypertens* 2016;10(4):336–345. © 2016 American Society of Hypertension. All rights reserved.

Keywords: Aerobic exercise; antihypertensive drug; blood pressure control; hypertension.

Conflict of interest: None of the authors has any conflict of interest to declare regarding this manuscript.

Neimeth Pharmaceutical Plc, Lagos, Nigeria, provided some of the drugs given to the participants in this study, and African Population and Health Research Centre (APHRC), Nairobi, Kenya, in partnership with the International Development Research Centre (IDRC) and Ford Foundation (ADDRF Award – 2010 ADDR- 022), through African Doctoral Dissertation Research Fellowship, provided funds for this study.

Trial Registration Number: ISRCTN81952488; <http://www.controlled-trials.com/ISRCTN81952488/>.

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Introduction

Hypertension is the leading risk factor for cardiovascular disease mortality worldwide.¹ About 26% (972 million) of the world adult population was estimated to have hypertension.² Two-thirds of this hypertension population were from economically developing countries.² Uncontrolled hypertension is a major public health concern.³ It is associated with various degrees of target organ damages.⁴

Medication adherence is a major factor in hypertension management.³ One of the factors identified to contribute to medication adherence is number of daily antihypertensive tablets >2 .⁵ Indeed, no less than 75% of individuals with hypertension require more than one antihypertensive agent to reach the recommended blood pressure (BP) goal.^{6,7}

Any individual with hypertension who either discontinues his medications or is nonadherent to the prescribed drug therapy is at risk of developing cardiovascular complications through uncontrolled BP.⁸ Thus, the best adherence to drug therapy is achieved with fewer drugs prescribed with the least possible frequency.⁹ In addition, multiple pharmacological treatment strategy is beset with problems of adverse drug reactions and interactions, unfavorable effects on comorbid conditions, and financial burden on the patient.¹⁰ Thus, a nonpharmacological antihypertensive management may be required as adjunct to antihypertensive drug therapy such that adequate BP control is attained with the minimum number of drugs possible.

Exercise is widely recommended as one of the key nonpharmacological agents to manage hypertension.¹¹ A recent meta-analysis indicated that aerobic exercise reduced systolic BP by 6.9 mm Hg and diastolic BP by 4.9 mm Hg.¹² These modest reductions in BP are clinically important in reducing risks of coronary artery disease, stroke, and all-cause mortality.¹³ Two previous studies had investigated the additive effects of antihypertensive drug on BP-reducing effects of physical exercise in individuals with moderate hypertension.^{14,15} Furthermore, two laboratory studies investigated the additive effects of physical exercise on BP-reducing effects of antihypertensive drug in spontaneously hypertensive rats.^{16,17} To our knowledge, no human study has investigated the possible additive BP-lowering effect of physical exercise on antihypertensive drug in individuals with hypertension. However, we have reported no significant additive BP-reducing effects of aerobic exercise on antihypertensive drugs in a pilot study.¹⁸ The current report presents findings from an adequately sampled study on effect of aerobic dance training on BP in individuals with uncontrolled hypertension after being on two antihypertensive drugs.

Methods

Study Design

This randomized controlled trial was part of a larger study on effect of aerobic exercise on cardiovascular health indices and health-related QoL in individuals with essential hypertension. It used aerobic dance training combined with antihypertensive drug therapy more than 12 weeks to determine whether the exercise will have additive BP-reducing effects on the drug therapy. The participants were randomly assigned to either the exercise group or the control group using a computer-generated random numbers. The participants in the two groups continued their antihypertensive medication throughout the study period, and the medications were adjusted as required by the physicians. In addition, the exercise group simultaneously underwent aerobic exercise training 3 days per week throughout the study period. The participants were assessed for BP, at baseline (not more than 2 days before the

commencement of the 12-week intervention), every 3 weeks during the study, and postintervention (within 2 days of termination of the 12-week intervention). In addition, number of antihypertensive drugs was assessed postintervention.

Participants

One-hundred and twenty individuals, aged 38 to 65 years, whose BP remained uncontrolled after 4 to 6 weeks of antihypertensive drug therapy and were of any category of adiposity indices participated. They were recruited from the Hypertension Clinic of the Medical Out-Patient Department of the University College Hospital, Ibadan, and Adeoyo Hospital, Ibadan. Participants were recruited from individuals new diagnosed as having essential hypertension. At the first visit, the individuals were screened for eligibility. This screening included medical history and physical examination as well as laboratory tests. They were excluded if they were pregnant or diabetic or had a history of coronary or valvular heart disease, renal disease, cerebrovascular disease, hepatic disease, or obstructive sleep apnea. They were also excluded if they had musculoskeletal problems that might make aerobic exercise participation impossible. Absence of secondary hypertension was confirmed in all participants using urinalysis and blood chemistry profile. Participants with recent history of smoking and alcohol abuse (<6 months) were also excluded. Participants were persuaded not to engage in any physical activity other than their normal daily activities during the study period. Participants gave written informed consent to participate in the study.

Two weeks after the first visit, the participants made a second visit when eligible participants were placed on one tablet of a thiazide diuretic (50 mg of hydrochlorothiazide+5 mg of hydrochloride amiloride-coamilozide) for 2 weeks. Participants whose BP was higher than 140/90 mm Hg after the 2 weeks were given 5 mg of amlodipine for another 2 weeks. At the end of this second 2-week period, those whose BP was still above 140/90 mm Hg but below the severe hypertensive range (180/110 mm Hg) were recruited into the study. The participants whose BP was still above 180/110 mm Hg had their amlodipine dose increased to 10 mg for another 2 weeks. After the third 2-week period, only those whose BP measurements were above 140/90 mm Hg but below the severe hypertensive range were again recruited into this study. In essence, only those who had mild-to-moderate hypertension (140/90 to <180/110 mm Hg) after being on one tablet of the thiazide in addition to either 5- or 10-mg amlodipine for 4 or 6 weeks, respectively, were randomly assigned to exercise and control groups using the computer-generated random number (Research Randomizer; www.randomizer.org). This random number generation was done before recruitment of participants.

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