IMPACT OF EXERCISE (WALKING) ON BLOOD PRESSURE LEVELS IN AFRICAN AMERICAN ADULTS WITH NEWLY DIAGNOSED HYPERTENSION

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Objectives: To determine whether the encouragement of walking an extra 30 minutes a day decreases blood pressure in adult African Americans with newly diagnosed hypertension.

Design: Randomized controlled study.

Participants and Setting: A total of 19 African American adults with newly diagnosed hypertension from an urban family medicine office were randomly assigned to intervention and control groups.

Intervention: The intervention group was advised to walk an extra 30 minutes per day. The control group was not given this advice. All subjects used pedometers to record the number of daily steps.

Main outcome measure: Change in systolic and diastolic blood pressure in the intervention and control groups after six months of trial, controlling for age and body mass index.

Results: At the end of six months, a mixed analysis of covariance did not reveal a significant group-by-time interaction for systolic blood pressure. However, positive effects of walking were evidenced; adjusted mean systolic blood pressure dropped by 9.0% for those in the intervention group and 2.33% for those in the control group. Similarly, adjusted mean diastolic pressure dropped by 7.42% for the intervention group and remained essentially unchanged for the control group ($P=.08$)

Conclusions: The findings of this study indicate that walking an extra 30 minutes a day is associated with lower mean blood pressure among adult African Americans with newly diagnosed hypertension. (*Ethn Dis*. 2007;17:503–507)

Key Words: African Americans, Walking, Hypertension

INTRODUCTION

Hypertension, which affects approximately 50 million people in the United States, is one of the most common and serious chronic diseases.[1] Defined by systolic blood pressure (SBP) of 140 mm Hg or higher or diastolic blood pressure (DBP) of 90 mm Hg or higher,[2] hypertension increases the risk for adverse cardiovascular and renal outcomes, such as myocardial infarction, stroke, congestive heart failure, end-stage renal disease, and peripheral vascular disease.[3–5] Data from as early as the 1960s indicates that the disease disproportionately affects subgroups of the population, with non-Hispanic African Americans having an age-adjusted prevalence of hypertension (32.4%) almost 40% higher than that noted in non-Hispanic Whites (23.3%) and Mexican Americans (22.6%).[6] Although hypertension-related mortality seems to be declining among African Americans, it continues to be a problem that disproportionately affects African Americans more than Whites, particularly in younger age groups.[7]

The management of hypertension is of particular importance for primary care providers, due not only to its prevalence, but also because it is a modifiable risk factor for cardiovascular diseases. Although there are a number of medications available for lowering blood pressure, the first step in managing hypertension should be lifestyle modification, including weight reduction and increased physical activity.[8,9]

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Walking is one of the safest and simplest exercises for hypertensive patients of all age groups. Combinations of walking, jogging and bicycling[10–13] have been shown to be effective in managing hypertension, but there are inherent risks associated with strenuous exercises like jogging and bicycling. Additionally, as most hypertensive patients tend to be overweight, jogging may not be an easy exercise for them. The positive effect of brisk walking on hypertension has been demonstrated in postmenopausal women.[14–16] Despite the recognized importance of finding ways to effectively manage hypertension in African Americans,[17] there is a paucity of studies on the effect of walking in this population. The purpose of this research was to study the impact of walking an extra 30 minutes a day on blood pressure in 25- to 59-year-old African Americans with newly diagnosed hypertension.

METHODS

Study Design, Participants and Setting

The study was conducted using a randomized pretest-posttest control group design after receiving approval

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Table 1. Descriptive characteristics of study participants at baseline

Variable	Group	
	Intervention	Control
N	8	10
Gender		
Male	2	4
Female	6	6
Age (yrs)	46.9 ± 5.2	42.0 ± 6.1
Weight (lb)	184.1 ± 23.5	236.1 ± 81.2
BMI	31.7 ± 5.9	37.2 ± 9.4
Mean steps walked per day	6,184.9	6,792.6
Mean Number of weeks of recorded data	15.3	14.5

Note: Values for age, weight, and BMI are listed as the mean ± SD.

from the institutional review board at the University of Illinois at Chicago.

Subjects were recruited from the outpatient clinic at the Department of Family Medicine, University of Illinois at Chicago. For inclusion, patients had to be African American, aged 25 to 59 years, with newly diagnosed hypertension (SBP≥140 mm Hg and/or DBP≥90 mm Hg). Documented elevated blood pressure recordings were required from two separate occasions before categorizing a patient as hypertensive. Patients were excluded from the study if they were unable to walk unassisted, did not have telephone access, were involved in any regular sports activity, were taking any type of antihypertensive medications, or if they had advanced renal, cardiovascular, or obstructive pulmonary disease.

Recruitment Process

The principal investigator introduced and explained the purpose and design of the study to all Family Medicine practitioners prior to the study. Practitioners were requested to refer potential study participants to the research team. Printed flyers, posted in the outpatient clinic, were used for recruitment purposes. Patients meeting the inclusion criteria were invited to participate in the study after completing a written informed consent document. A total of 19 patients agreed to participate in the study; one was later excluded from the analysis because it was found that she was taking antihypertensive medication prescribed by her physician. Hence, the final analyses had 8 patients in the intervention group and 10 in the control.

Participant Characteristics

Subjects ranged in age from 32 to 54 years and included six males. All 18 subjects remained enrolled in the study for the required six months. However, not all subjects were able to record their steps walked for the complete study period due to various reasons. The duration for which subjects recorded data ranged from 1 to 26 weeks, mean 14.83 (SD=9.64). (Table 1) Subjects' self-reported reasons for not being able to record steps included forgetting to wear the pedometer, illness during the study period, and being on vacation or travel.

Data Collection and Analysis

Using a random allocation sequence developed by our statistician, study subjects were randomly allocated to one of two groups: intervention or control. The control group received standard medical care provided by primary care providers who were aware that the patients were enrolled in the study. The intervention group, in addition to standard medical care, was encouraged by the researchers to walk an extra 30 minutes a day, five to seven days a week. Standard medical care[2] for newly diagnosed hypertensive patients consists of lifestyle modification, including encouragement to increase physical activity and dietary sodium restriction. The control group was encouraged to follow the advice of their healthcare provider without specific mention of extra walking. The study duration was 26 weeks. A set of measurements was taken at baseline from both groups. These measurements included blood pressure, pulse, height, and weight. The measurements were obtained, using a standardized instrument, by one person, who was blind to the groups. The blood pressure measurements were taken according to the guidelines established by the American Society of Hypertension.[18] Blood pressure was measured by applying a sphygmomanometer cuff, of appropriate size, to the left brachial artery, with the patient in a sitting position, after being seated quietly for five minutes. For consistency, the same sphygmomanometer was used during the entire study period. A second blood pressure reading was taken five minutes after the first. Final blood pressure was calculated by using the average of the two readings and rounded to the closest number. A pulse count was taken from the left radial artery. Weight was measured without clothes or shoes, except underwear. Height was measured without shoes and socks. Subjects' body mass index (BMI) was computed using height and weight measurements.

All subjects were provided a pedometer (New Lifestyles Digi-Walker Model SW-200, manufactured by the Yamax Co, Japan) to keep a daily record of the number of steps they walked. The number of steps walked at baseline was extrapolated from existing data on the average number of steps walked by adult African Americans, approximately 4580 steps per day.[19] Subjects were asked to wear the pedometer during all waking hours and record the number of steps they walked at the end of each day. Both intervention and control group participants were contacted every two weeks

via telephone to get a report of the number of steps they had walked in the previous two weeks. Participants of the intervention group were reminded to walk an extra 30 minutes per day in addition to their routine physical activity. During each phone contact, the control group participants were encouraged to follow the advice of their healthcare providers. Both groups were reminded to adhere to a low-salt diet. All baseline measurements were repeated six months later using the same method.

Data were analyzed using SPSS version 13.0 (Chicago, Ill). Descriptive statistics were computed for all measurements. To test the impact of the intervention, separate 2 (group: intervention vs control) x 2 (time: baseline vs 6 months) mixed model analyses of variance (ANOVA) were conducted for systolic and diastolic blood pressure respectively. Given the notable differences in age and BMI observed in Table 1, these two variables were used as covariates in tests of significance. Effect sizes were calculated to determine the magnitude of blood pressure change from baseline to 6 months.

RESULTS

Main Analysis

Table 1 shows the descriptive statistics for sex, age, weight, BMI, mean steps walked per day, and mean number of weeks of recorded data for the participants in both study groups. On average, those in the intervention group were about 5 years younger and those in the control group were 52 pounds heavier.

The adjusted systolic blood pressure means for the intervention and control groups are shown in Table 2 and Figure 1. The group-by-time interaction was not statistically significant, F (1, 14)=1.56, P=.232. However, the intervention group showed a reduction of 9.0% over the study period, whereas the control group dropped by 2.33%. The difference in these reductions is also reflected in the tabled effect sizes (3.37 vs 0.97 for the intervention and control groups, respectively).

Table 2. Blood pressure values for study groups at baseline and 6 month follow-up

Variable	Group	
	Intervention	Control
SBP (mm Hg)		
Baseline	147.7 ± 4.5	146.2 ± 4.0
6 Months	134.4 ± 3.4	142.8 ± 3.0
Effect size	3.37	0.97
% change	−9.00	−2.33
DBP (mm Hg)		
Baseline	95.7 ± 3.2	93.9 ± 2.9
6 Months	88.6 ± 2.6	94.8 ± 2.3
Effect size	2.45	0.35
% change	−7.42	+0.96

Note: Mean values were adjusted for age and BMI and are listed as mean ± SD. Effect sizes were calculated as mean BP baseline minus mean BP at 6 months divided by the pooled SD.

Table 2 and Figure 2 present the adjusted mean diastolic blood pressure values. The group-by-time interaction for this variable nearly reached the conventional level of significance, F (1, 14)=3.56, P=.080. Over the study period, there was a 7.42% reduction in the means for the intervention group while the means for the control group remained essentially unchanged. Again, the difference in group outcome is reflected in the tabled effect sizes (2.45 vs 0.10 for the intervention and control groups, respectively).

DISCUSSION

This study explored the effect of encouragement of walking in a sample of African American adult patients with newly diagnosed hypertension. Overall, by the end of the study period, the

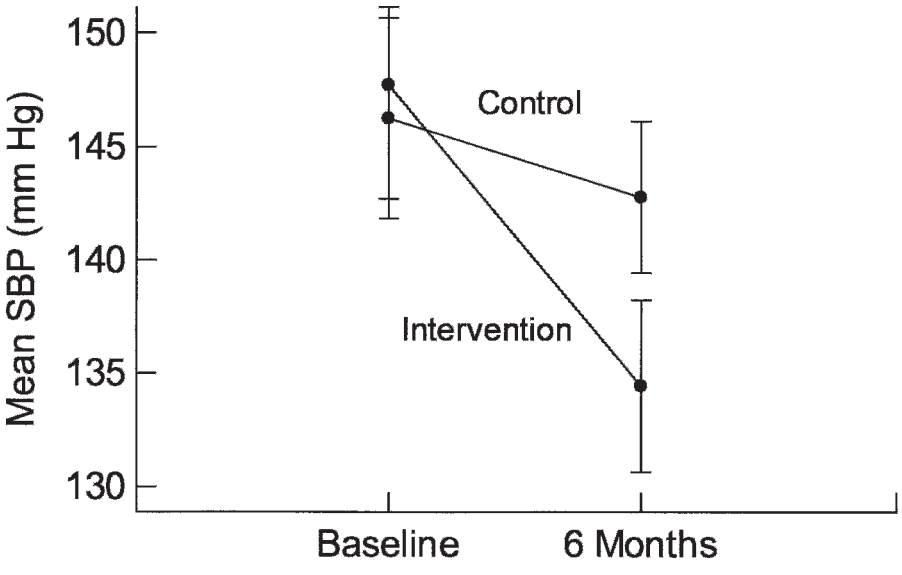

Figure 1. Mean systolic blood pressures with standard errors at baseline and six months for the intervention and control groups. Means are adjusted for age and BMI

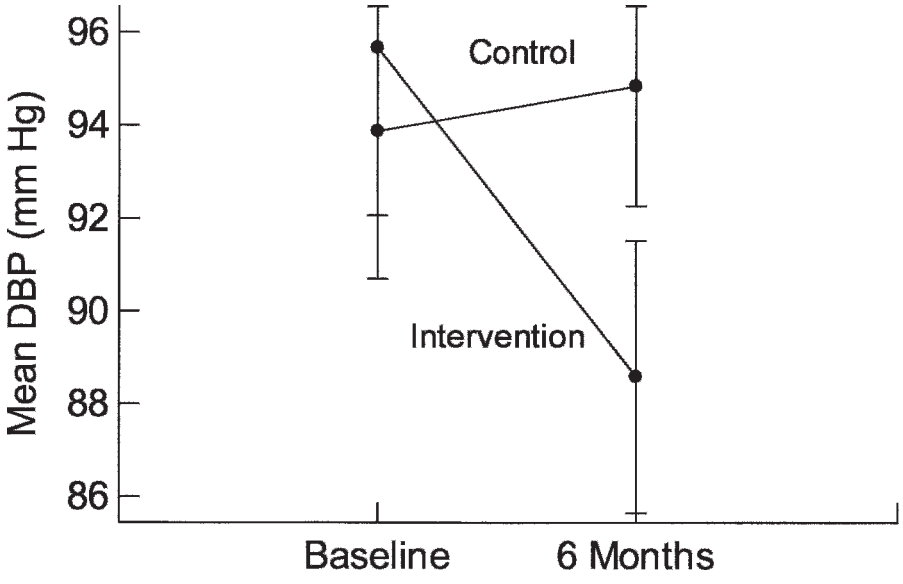

Figure 2. Mean diastolic blood pressures with standard errors at baseline and six months for the Intervention and control groups. Means are adjusted for age and BMI

intervention group demonstrated a reduction in both SBP and DBP. The control group demonstrated a reduction in SBP but not in DBP. The between-group differences for both SBP and DBP were not statistically significant. However, the reduction in blood pressure noted in both groups for SBP and for the intervention group for DBP, may be clinically meaningful; this lowering of blood pressure could be a significant reason for continuing lifestyle modification without starting antihypertensive medications.

This pilot study failed to show a statistically significant decrease in blood pressure change between the intervention and control groups when the intervention group participants were encouraged to walk an extra 30 minutes a day for 5 to 7 days a week for 6 months. The lack of statistically significant difference in blood pressure change between the two groups is not a surprise as there was no significant difference in the number of steps walked between the two groups. In fact, on average, the control group walked a slightly greater number of steps per day. One explanation for this finding may be that the pedometer, supplied to both groups, may have inadvertently acted as a motivator for walking in addition to being used as a recording device. Research evidence suggests that a pedometer could be used as a motivator for walking.[20–22] Therefore, it is possible that the control group in this study may also have been motivated to walk more. The other possibility is that the providers for the control group may have encouraged them to increase their physical activity for they were patients with newly diagnosed with hypertension.

A previous study conducted in postmenopausal women[16] found that those who walked an average 9700 steps per day had a decrease in SBP by 6 mm Hg in 12 weeks and another 5 mm Hg in 24 weeks. However, there was no change in blood pressure in their control group who walked an average 7200 steps per day. Another study of Japanese men indicates that hypertensive men who walked more than 10,000 steps per day showed an average 10 mm Hg decrease in SBP and an average 8 mm Hg decrease in DBP as compared to those who were sedentary.[23] Based on previous research on this subject, and the findings of the present study, it may be reasonable to state that encouraging patients to walk an extra 30 minutes a day may be enough to cause a small decrease of blood pressure in patients with newly diagnosed hypertension.

The intervention group demonstrated a decrease in both systolic and diastolic blood pressure.

Our study has certain limitations. First, due to the small sample size, the study may not have had sufficient power. The small sample size certainly limits the external validity of the study, thus results cannot be generalized to the whole African American adult population. Second, the lack of compliance in recording the number of steps walked was quite substantial. Though every effort was made to address this issue by contacting the study participants every two weeks, the subjects of this study were no exception to the ongoing challenge of ensuring that study subjects adhere to research protocols. Nevertheless, the large effect sizes for the intervention group lead us to suggest that future research is warranted to study the impact of exercise, especially walking, on blood pressure levels with larger samples and a greater number of walking steps prescribed for the intervention groups. Considering the suitability and broad appeal of walking, this randomized controlled study has clinical relevance for the application of walking intervention in future studies of African Americans with newly diagnosed hypertension.

In conclusion, the intervention group demonstrated a decrease in both systolic and diastolic blood pressure. Although this decrease was not statistically significant when compared with the control group, the findings have clinical significance because of the large

effect sizes for the intervention group. Although it is widely recognized that walking should be encouraged and promoted as a safe and easy first line physical activity in African American adults with newly diagnosed hypertension, the specific advice about walking needs to be modified. Instead of advising patients to walk an extra 30 minutes a day, a specific goal of the number of walking steps needs to be agreed upon by both the physician and the patient. Based on previous studies in other populations, walking 10,000 or more steps a day appears to be a more useful, goal-based advice for African American adults with newly diagnosed hypertension. Future studies can address the utility of such advice. The challenges faced through the process of this study (subject recruitment, retention and data collection) also should provide useful information to other researchers conducting research in practice-based settings.

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