A Bout of Resistance Exercise Following the 2007 AHA Guidelines Decreases Asleep Blood Pressure in Mozambican Men

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1Faculty of Physical Education and Sports, University of Pedagogica, Maputo, Mozambique; 2Exercise Hemodynamic Laboratory (LAHAM), School of Physical Education and Sport, University of São Paulo, São Paulo, Brazil; and 3Faculty of Medicine, Eduardo Mondlane University, Maputo, Mozambique

ABSTRACT

Prista, A, Macucule, CF, Queiroz, ACC, Silva Jr, ND, Cardoso Jr, CG, Tinucci, T, Damasceno, AAM, and Forjaz, CLM. A bout of resistance exercise following the 2007 AHA guidelines decreases asleep blood pressure in Mozambican men. J Strength Cond Res 27(3): 786–792, 2013—Hypertension is highly prevalent among African individuals and descendants, and in this ethnic group, asleep blood pressure is strongly associated with target organ damage. After its execution, a single bout of resistance exercise may decrease blood pressure in white individuals, but its effects are unknown in Africans. This study investigated the effects of a bout of resistance exercise, conducted in accordance with the 2007 American Heart Association (AHA) guidelines, on postexercise blood pressure in African subjects. Twenty-four Mozambican men (40 ± 2 years) underwent, in a random order, 2 experimental sessions: control (sitting resting) and exercise [8 resistance exercises, 1 set, 10–15 repetitions, 30–40% of 1 repetition maximum (1RM) for upper-body muscles and 50–60% of 1RM for lower-body muscles]. Before and after the interventions, clinic blood pressure was measured. Ambulatory blood pressure was also evaluated after both sessions. Clinic systolic blood pressure did not change after both interventions, whereas diastolic blood pressure increased significantly and similarly after the control and the exercise sessions. Twenty-four-hour (127 ± 3 mm Hg vs. 130 ± 3 mm Hg and 78 ± 2 mm Hg vs. 81 ± 2 mm Hg, respectively, p < 0.05) and asleep (119 ± 4 mm Hg vs. 123 ± 4 mm Hg and 69 ± 3 mm Hg vs. 72 ± 3 mm Hg, respectively, p < 0.05) systolic and diastolic blood pressures were lower after the exercise than in the control session. These results show that in African men, a single bout of resistance exercise, conducted in accordance with 2007 AHA guidelines, decreased 24-hour and asleep blood pressures. These reductions might represent an important benefit for African individuals and descendants among whom target organ damage is mainly associated with ambulatory blood pressure levels.

KEYWORDS strength exercise, ambulatory blood pressure, ethnic, Africa

INTRODUCTION

Hypertension is a worldwide health problem, affecting more than 30% of the adult population in developed and developing countries alike (22). In addition, its prevalence is increasing expressively more in developing countries, such as in Africa (12). Hypertension prevalence is considerably greater among African than non-African individuals and descendants (13). In Mozambique, this disease affects approximately 33% of the population (3). In addition, hypertension is associated with greater end-organ damage in ethnically African individuals, which is partly attributed to the higher asleep blood pressure presented by these individuals (11,16).

Most of the disparities among different ethnic groups in hypertension risk and outcomes observed in Europe and America are now believed to be because of environmental aspects rather than race or ethnicity (4,35). Guidelines for hypertension treatment state that a good blood pressure control is important in all the ethnic groups and that treatment should include pharmacological and nonpharmacological approaches (6,35).

One important and probably genuine difference among racial groups is the significantly suppressed activity of the renin-angiotensin-aldosterone system in African-origin hypertensive patients (4), which makes them less responsive to drugs that block the renin-angiotensin system and increases their responsiveness to low-salt diets. However, the effect on the sensitivity to exercise therapy is unknown.
Classically, aerobic training is recommended for prevention and treatment of hypertension. A single bout of aerobic exercise promotes a clinically relevant postexercise hypotension (24). After aerobic exercise, systolic/diastolic blood pressures decrease about 10/7 mm Hg in hypertensive individuals (15), and this effect might last for 24 hours (7,28,32). However, these data were mainly obtained in non-African descendants. Studies with African Americans have failed to show any hypotensive effect (5) and actually reported an increase (23) in blood pressure after aerobic exercise. Thus, it is interesting to investigate whether other kinds of exercise are able to induce postexercise hypotension in African individuals.

More recently, resistance training has been included in the recommendation of physical exercise for hypertensive patients (24). In previous studies, we observed that a single bout of resistance exercise decreased postexercise clinic (26,27,33) and 24-hour (18) blood pressures. However, to our knowledge, no previous investigation studied these acute postresistance exercise effects in African individuals or descendants. Nevertheless, Hefferman et al. (9,10) conducted a set of studies that showed important cardiovascular benefits, such as a reduction in blood pressure, vascular resistance, and arterial stiffness, after a short-term (6 weeks) resistance training in African American subjects (18). These results suggest that resistance exercise may decrease blood pressure in African individuals and thus it may present acute postexercise hypotensive effects. In addition, if postresistance exercise hypotension is maintained for a long period of time after exercise, persisting under ambulatory conditions while individuals were performing their daily activities, this hypotensive effect will have clinical importance, strengthening the need to recommend this kind of exercise.

Based on previous arguments, we hypothesized that, in Mozambican men, a single bout of resistance exercise would decrease clinic and ambulatory blood pressures after its execution.

METHODS

Experimental Approach to the Problem

To check the study hypothesis, all the subjects who volunteered to the study underwent 2 experimental sessions. In one of them, they performed a session of resistance exercise (exercise session), and in the other (control session), they remained at rest. To evaluate whether resistance exercise promotes an acute hypotensive effect, blood pressure was measured after the exercise and was compared with the values obtained before the exercise and after the control session.

Great care was taken to increase the scientific quality of the experimental design and to guarantee the clinical applicability of the results. The experiments were conducted throughout the year, decreasing any possible influence of the time of the season in the results. The order of the experimental sessions for each subject was randomly assigned to assure that no effect of adaptation to the test procedure would affect the results. A control condition was included to allow for controlling the physiological alterations induced by laboratorial experimental conditions, such as keeping the sitting position for many minutes. Clinic blood pressure was assessed in the laboratory to allow for comparison with previous studies. Ambulatory blood pressure was assessed by 24-hour monitoring after both experimental sessions to permit the evaluation of the occurrence of postexercise hypotension under real-life conditions. The exercise protocol employed in the study followed the recommendations of the 2007 American Heart Association (AHA) guidelines of resistance exercise in patients with cardiovascular problems (34) to assure its clinical validity and applicability.

Subjects

Forty volunteers were recruited by advertising. From them, 28 initiated the study, but 4 of them gave up because of incompatibility between the study and work hours (n = 2), health problems (n = 1), and an unknown reason (n = 1). Thus, 24 Mozambican men, aged between 28 and 52 years, participated in the study. The procedures were carried out in accordance with the guidelines of the Declaration of Helsinki on human experimentation, and the study was approved by the Bioethics Committee from the Ministry of Health of Mozambique. Subjects provided written informed consent after having the risk and benefits explained to them.

All subjects were apparently healthy. In a clinical assessment, they presented normal physical examination, no history of cardiovascular disease, and they were not taking any regular medication. In addition, none of them was engaged in any regular physical activity program. Physical and cardiovascular characteristics of the subjects are presented in Table 1.

Procedures

The study protocol consisted of 7 sessions conducted on different days with an interval of at least 48 hours between

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean ± SE</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (y)</td>
<td>40.8 ± 1.4</td>
<td>28</td>
<td>52</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>72.8 ± 2.2</td>
<td>53.5</td>
<td>106</td>
</tr>
<tr>
<td>Height (cm)</td>
<td>171 ± 2</td>
<td>155</td>
<td>183</td>
</tr>
<tr>
<td>Body mass index (kg/m²)</td>
<td>24.9 ± 0.7</td>
<td>18.8</td>
<td>33.5</td>
</tr>
<tr>
<td>24-h systolic BP (mm Hg)</td>
<td>130 ± 3</td>
<td>108</td>
<td>155</td>
</tr>
<tr>
<td>24-h diastolic BP (mm Hg)</td>
<td>81 ± 2</td>
<td>65</td>
<td>99</td>
</tr>
<tr>
<td>24-h heart rate (b · min⁻¹)</td>
<td>70 ± 2</td>
<td>56</td>
<td>88</td>
</tr>
</tbody>
</table>

BP = blood pressure.

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When entering the study, all the subjects underwent an ambulatory blood pressure monitoring for familiarization with the procedure (session 1). Then, they participated in 3 exercise familiarization sessions (sessions 2, 3, and 4). In each session, they performed 1 set of 8–12 repetitions in the 8 exercises that were employed in the experimental protocol (leg press, abdominal curl, lower back, chest press, low row, leg extension, arm extension, and arm curl—Technogym Wellness, Gambettola, Italy) with the lowest workload allowed by the machines and keeping 1 minute of rest between exercises. Afterward, in another session (session 5), they underwent a test for estimating the 1 repetition maximum (1RM) for each exercise following the procedure proposed by Lombardi (14).

Then, all the subjects underwent the 2 experimental sessions (control and exercise), performed in a random order (session 6 and 7). Subjects were asked to refrain from formal exercise and alcohol ingestion for a minimum of 24 hours before these sessions. They were also instructed to take a similar light meal 2 hours before the experiments and to avoid caffeine and other substances that might influence blood pressure. Subjects drank water “ad libitum” before the experiments, but no water ingestion was allowed during the experiments that were initiated between 1 and 3 PM.

In each session, subjects rested in the sitting position for 20 minutes. Clinic blood pressure and heart rate were measured after 5 and 10 minutes, and a mean value was calculated as the preintervention value (PRE). Afterward, they went to the gym room where they (a) rested in the resistance exercise machines in the control session and (b) performed 1 set of 8–12 repetitions in the 8 exercises exposed before in the exercise session. One minute of rest was guaranteed between

### Table 2. Estimated 1RM, workload employed during the experimental session, and the corresponded percentage of 1RM for each exercise.*

<table>
<thead>
<tr>
<th>Exercise</th>
<th>1RM (kg)</th>
<th>Workload (kg)</th>
<th>% of 1RM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leg press</td>
<td>170.0 ± 5.9</td>
<td>97.9 ± 3.6</td>
<td>57.6 ± 0.7</td>
</tr>
<tr>
<td>Abdominal curl</td>
<td>46.1 ± 1.7</td>
<td>26.4 ± 0.9</td>
<td>57.3 ± 0.7</td>
</tr>
<tr>
<td>Lower back</td>
<td>80.0 ± 3.2</td>
<td>46.8 ± 2.0</td>
<td>58.3 ± 0.6</td>
</tr>
<tr>
<td>Chest press</td>
<td>70.2 ± 2.4</td>
<td>26.8 ± 0.9</td>
<td>38.0 ± 0.6</td>
</tr>
<tr>
<td>Low row</td>
<td>101.5 ± 2.3</td>
<td>38.4 ± 1.0</td>
<td>37.5 ± 0.5</td>
</tr>
<tr>
<td>Leg extension</td>
<td>66.0 ± 2.4</td>
<td>38.5 ± 1.2</td>
<td>58.5 ± 0.6</td>
</tr>
<tr>
<td>Arm extension</td>
<td>65.3 ± 2.8</td>
<td>24.9 ± 1.0</td>
<td>38.0 ± 0.7</td>
</tr>
<tr>
<td>Arm curl</td>
<td>40.8 ± 1.6</td>
<td>15.8 ± 0.6</td>
<td>39.0 ± 1.0</td>
</tr>
</tbody>
</table>

*Data = mean ± SE. 1RM = 1 repetition maximum.

### Table 3. Systolic, diastolic, and mean blood pressures, as well as HR and RPP measured before and after 30, 45, and 60 minutes of the interventions in the experimental sessions.*

<table>
<thead>
<tr>
<th></th>
<th>PRE</th>
<th>POST30</th>
<th>POST45</th>
<th>POST60</th>
<th>Session</th>
<th>Stage</th>
<th>Interaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>SBP (mm Hg)</td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Control</td>
<td>121 ± 3</td>
<td>121 ± 3</td>
<td>122 ± 4</td>
<td>122 ± 3</td>
<td>0.58</td>
<td>0.82</td>
<td>0.19</td>
</tr>
<tr>
<td>Exercise</td>
<td>121 ± 3</td>
<td>121 ± 3</td>
<td>120 ± 3</td>
<td>119 ± 3</td>
<td>0.88</td>
<td></td>
<td></td>
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<tr>
<td>DBP (mm Hg)</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>78 ± 3</td>
<td>81 ± 3†</td>
<td>83 ± 3†</td>
<td>83 ± 3†</td>
<td>0.43</td>
<td>0.00</td>
<td>0.88</td>
</tr>
<tr>
<td>Exercise</td>
<td>77 ± 3</td>
<td>81 ± 3†</td>
<td>81 ± 2‡</td>
<td>81 ± 2‡</td>
<td>0.44</td>
<td></td>
<td></td>
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<tr>
<td>MBP (mm Hg)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>92 ± 3</td>
<td>95 ± 3†</td>
<td>96 ± 3†</td>
<td>96 ± 3†</td>
<td>0.34</td>
<td>0.00</td>
<td>0.46</td>
</tr>
<tr>
<td>Exercise</td>
<td>92 ± 3</td>
<td>94 ± 3†</td>
<td>94 ± 3†</td>
<td>94 ± 3†</td>
<td>0.25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HR (b·min⁻¹)</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Control</td>
<td>67 ± 2</td>
<td>62 ± 2‡</td>
<td>62 ± 2‡</td>
<td>61 ± 2‡</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Exercise</td>
<td>69 ± 3</td>
<td>71 ± 2‡</td>
<td>68 ± 2</td>
<td>67 ± 2</td>
<td>0.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RPP (mm Hg·b·min⁻¹)</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>8,078 ± 322</td>
<td>7,562 ± 351‡</td>
<td>7,560 ± 367‡</td>
<td>7,407 ± 336†</td>
<td>0.01</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Exercise</td>
<td>8,402 ± 438</td>
<td>8,611 ± 377‡</td>
<td>8,246 ± 355‡</td>
<td>7,974 ± 360‡</td>
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</tr>
</tbody>
</table>

*Data = mean ± SE. SBP = systolic blood pressure; DBP = diastolic blood pressure; MBP = mean blood pressure; HR = heart rate; RPP = rate pressure product; PRE = before interventions; POST30 = after 30 minutes; POST45 = after 45 minutes; POST60 = after 60 minutes.

†Significantly different from PRE (p < 0.05).
‡Significantly different from the control session (p < 0.05).
the exercises. A workload corresponding to 50–60% of 1RM was employed for the lower-body exercises (leg press, abdominal curl, lower back, and leg extension) and 30–40% of 1RM for the upper-body exercises (chest press, low row, arm extension, and arm curl) (34). After the intervention period, subjects returned to the laboratory and stayed resting in the sitting position for 60 minutes (postintervention period). Clinic blood pressure and heart rate were measured every 5 minutes. Mean values were calculated for 25 and 30 minutes (POST30), 40 and 45 minutes (POST45), and 55 and 60 minutes (POST60).

After the evaluations, the subjects had 20 minutes to take a bath and change clothes. Then, an ambulatory blood pressure device was installed on their nondominant arm to take measurements every 20 minutes for 24 hours. Subjects were instructed to avoid exercise and alcohol ingestion while with the monitor, to report all activities carried out during the 24 hours, and to keep similar patterns of activity and sleep after both experimental sessions.

Clinic blood pressure was measured by the same trained observer employing the auscultatory method and a calibrated aneroid sphygmomanometer (Baumanometer, New York, NY, USA). Phases I and V of the Korotkoff sounds were employed, respectively, for determining systolic and diastolic blood pressures. Mean blood pressure was calculated by the sum of diastolic blood pressure and one-third of pulse pressure (difference between systolic and diastolic blood pressure). Heart rate was measured by a heart rate monitor (Polar, Kempele, Finland). Rate pressure product was calculated by the product between heart rate and systolic blood pressure.

Ambulatory blood pressure was assessed by an oscillometric device (Spacelabs 90207; Spacelabs, Inc., Redmond, Washington, USA). Device calibration was regularly checked. Ambulatory data was analyzed by the following averages: 24 hours (all measures taken during 24 hours), awake (all measures taken while subjects reported to be awake), and asleep (all measures taken during the period that the subject reported to be sleeping) periods.

Statistical Analyses
Considering a power of 90%, an alpha error of 5%, and an SD of 2.5 mm Hg, the minimum sample size necessary to detect a difference of 4 mm Hg in 24-hour blood pressure was calculated to be 10 subjects.

The normal distribution of the data was verified by Shapiro-Wilk test. To evaluate whether clinic blood pressure measured after exercise was lower than preexercise and in the control session, values measured pre and postinterventions in both experimental sessions were compared by a 2-way analysis of variance for repeated measures (Statistica for Windows release 4.3; Statsoft, Inc., Tulsa, OK, USA), establishing sessions (control and exercise) and stages (PRE, POST30, POST45, and POST60) as the main factors. Post hoc comparisons were made by Newman-Keuls test. To test whether blood pressure was lower after exercise than after the control session for many hours, ambulatory data were compared between the experimental sessions by paired Student’s t-test. In the literature, ambulatory blood pressure reproducibility is reported as good (21). In the Mozambican laboratory, the 24-hour reliability was
similar to data reported in the literature (intraclass correlation coefficient [confidence interval]: systolic blood pressure = 0.755 [0.430–0.895] and diastolic blood pressure = 0.767 [0.458–0.901]). A value of \( p \leq 0.05 \) was accepted as significant. Data are presented as mean \( \pm SE \).

**RESULTS**

The mean workload and relative intensity employed for each resistance exercise are shown in Table 2.

Clinic systolic blood pressure did not change after the intervention in either of the sessions, whereas diastolic (\( p = 0.000 \)) and mean (\( p = 0.000 \)) blood pressures increased significantly and similarly after the interventions in both experimental sessions (Table 3).

In comparison with the PREs, heart rate decreased significantly in the control session (\( p = 0.000 \)), whereas it increased significantly until 30 minutes after the exercise (\( p = 0.035 \)). Heart rate was significantly higher after the exercise than the control session throughout the postintervention period (\( p = 0.000 \)) (Table 3).

In comparison with PREs, rate pressure product decreased significantly in the control session throughout the postintervention period (\( p = 0.000 \)), whereas it decreased significantly only at 60 minutes after the intervention in the exercise session (\( p = 0.026 \)). Rate pressure product was significantly higher in the exercise than the control session throughout the postintervention period (\( p = 0.000 \)) (Table 3).

Figure 1 shows ambulatory blood pressure profile after both interventions. Twenty-four-hour systolic (\( p = 0.026 \)), diastolic (\( p = 0.002 \)), and mean (\( p = 0.008 \)) blood pressures were significantly lower after the exercise than the control session. Similarly, asleep systolic (\( p = 0.043 \)) and diastolic (\( p = 0.054 \)) blood pressures were also significantly lower after the exercise session, and asleep mean blood pressure tended to be lower in this session (\( p = 0.061 \)). On the other hand, daytime systolic, diastolic, and mean blood pressures, as well as 24-hour, asleep, and awake heart rates did not differ between the experimental sessions (Table 4). Complementary statistical analyses were performed establishing blood pressure status (normotensive or hypertensive) as an additional main factor and including body mass index as a covariate. In these analyses, no significant influence of these variables was observed in the blood pressure responses to the exercise.

**DISCUSSION**

The main finding of this study is that a single session of resistance exercise, conducted in accordance with the 2007 AHA recommendations, did not decrease blood pressure measured after exercise in clinical conditions but reduced ambulatory blood pressure, especially during sleeping.

The absence of a reduction in clinic blood pressure after resistance exercise differs from previous studies that observed clinical postexercise hypotension after resistance exercise in mixed ethnic and mainly non-African samples (18–20,26,27,29). The mechanisms responsible for the absence of postexercise hypotension were out of the scope of this investigation. However, it is known that when individuals remained seated for a long time, venous return decreases because of the orthostatic stress, and the cardiopulmonary reflex is deactivated, producing an increase in peripheral sympathetic activity, vascular resistance, and diastolic blood pressure (8). After exercise, the decrease in venous return is greater than that in a control condition, which should produce a greater vasoconstriction. However, in non-African individuals, exercise acts on the peripheral vessels, abolishing the vasoconstriction induced by the cardiopulmonary deactivation, which results in a decrease in clinic blood pressure after exercise (27,33). As African individuals present greater vascular responsiveness to adrenergic stimulus and lower responsiveness to vasodilation (31), it is possible that the peripheral vasodilatory effect of exercise was blunted in these individuals, and, consequently, clinical postexercise hypotension did not occur in this population. This hypothesis needs to be addressed by future research.

In contrast to clinic blood pressure responses after resistance exercise, 24-hour and asleep blood pressure
decreased significantly, which shows an important hypotensive effect of previous exercise in African individuals. We were able to find only one previous study that observed asleep blood pressure reduction after a bout of resistance exercise (1). This study was conducted in Brazil, where mixed ethnic samples are common, and it was observed that only asleep diastolic blood pressure was reduced after exercise. In the present investigation, systolic and diastolic blood pressures decreased after the exercise, and the greater hypotensive effect might be explained by the fact that our study involved subjects with different preexercise blood pressure levels, whereas in the previous study, only normotensives were included (1). It is known that blood pressure reduction after exercise is greater in individuals with higher blood pressure levels (18,26).

The mechanisms by which resistance exercise reduced asleep blood pressure are out of the scope of this study. However, the decline of sympathetic nerve activity during sleeping (30), allowing the occurrence of the hypotensive effect of previous exercise in individuals who present high adrenergic responsiveness, such as Africans, is a possible hypothesis that deserves future investigation.

It is interesting to note that besides the reduction in asleep blood pressure produced by previous exercise, there was no increase in nocturnal blood pressure fall after the exercise session, in comparison with the control session (systolic \(-9.8 \pm 1.5\%\) vs. \(-8.3 \pm 1.7\%, p = 0.205\), and diastolic \(-17.8 \pm 2.2\%\) vs. \(-16.1 \pm 2.3\%, p = 0.370\), respectively), which may be attributed to the nonsignificant decrease of the awake blood pressures after exercise.

The decrease in ambulatory blood pressure levels after a single bout of resistance exercise in African individuals is in accordance with the study hypothesis. This result shows that resistance exercise may be applied in clinical practice for producing postexercise hypotension. That is an important finding since previous studies revealed that aerobic exercise failed to produce this hypotensive effect in African Americans (5). Future studies, however, need to investigate the mechanisms underlying the postexercise blood pressure responses in African individuals and the replication of the results in other African-descendant populations.

This study has some limitations. Postexercise hypotensive effect may depend on the exercise protocol. The exercise protocol employed was composed of only 1 set of 8–12 repetitions and lasted approximately 12.5 minutes. There is some evidence that protocols with greater volume may produce greater postexercise hypotensive effects (17,25). However, the protocol was chosen based on clinical recommendations to amplify the results’ applicability. In addition, besides the low volume, a significant decrease in ambulatory blood pressure was detected, which strengthens the results’ clinical importance. Data are obtained in African subjects from one city in Africa (Maputo), but they may be similar in African individuals from other countries of this continent, and they should be tested in other African-descendant populations and also in other non-African populations.

In conclusion, a single bout of resistance exercise, as simple as the one recommended by the 2007 AHA guidelines, reduced 24-hour and asleep blood pressures in Mozambican men.

**Practical Applications**

The findings of this study might have important clinical implications since ambulatory blood pressure has a stronger association with hypertension morbimortality rates than clinic blood pressure (2), and in African individuals, asleep blood pressure is the ambulatory parameter having greater association with left ventricular hypertrophy (11). In addition, previous studies with aerobic exercise, which is classically recommended for hypertension treatment (24), have failed to show acute (5,23) reductions of blood pressure in African descendants. Thus, the present results suggest that resistance training might be an alternative exercise strategy for blood pressure reduction in African individuals and descendants. It is noteworthy that this study was conducted with genuine African subjects, which might strengthen the applicability of this intervention for developing countries in Africa where hypertension prevalence is increasing (3).

**Acknowledgments**

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Postexercise Hypotension in African Men


