

ORIGINAL REPORTS: CARDIOVASCULAR DISEASE IN MINORITY POPULATIONS

IMPACT OF BREATHING AWARENESS MEDITATION ON AMBULATORY BLOOD PRESSURE AND SODIUM HANDLING IN PREHYPERTENSIVE AFRICAN AMERICAN ADOLESCENTS

Objectives: This study evaluated the impact of a breathing awareness meditation (BAM) program on ambulatory blood pressure and sodium handling in African American adolescents with high-normal systolic blood pressure (SBP) levels.

Design and Methods: Following three consecutive days of SBP screenings, 66 eligible ninth graders were randomly assigned by school to either BAM ($n=20$) or health education control ($n=46$) groups. The BAM group engaged in 10-minute BAM sessions at school and at home each day for three months. Teachers conducted sessions at school during health classes. Before and after the intervention, overnight urine samples were collected, and ambulatory SBP, diastolic blood pressure, and heart rate were recorded periodically for 24 hours.

Results: Significant changes before and after the intervention were observed between BAM and control groups for SBP during school hours (-4.7 vs $.9$ mm Hg, $P<.05$), SBP at night (-4.8 vs $-.6$ mm Hg, $P<.01$), and heart rate during school hours (-6.7 vs -2.3 bpm, $P<.02$), adjusted for their respective pre-intervention levels. The overnight urinary sodium excretion rate decreased in the BAM group but increased in the control group (-3.3 ± 4.9 vs 1.1 ± 4.0 mEq/hour, $P<.03$).

Conclusions: These findings demonstrate the potential beneficial impact of BAM taught by school health teachers on blood pressure control in the natural environment in African American youth at risk for development of hypertension. (*Ethn Dis.* 2008;18:1-5)

Key Words: Adolescents, Blood Pressure Monitoring, Meditation, Hypertension, Sodium Handling, African American, Clinical Trials

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INTRODUCTION

Essential hypertension remains a major health problem in the United States,¹ and the prevalence of hypertension among children is increasing.² African Americans experience a higher prevalence and earlier onset of hypertension than other ethnic groups in the United States.³ This disparity begins early; African Americans have higher blood pressures than do other ethnic groups from childhood onward.⁴ A number of stress-related factors contribute to hypertension, particularly among African Americans. Beginning in childhood, African Americans are exposed to social and environmental stressors (eg, aversive social interactions related to socioeconomic status inequality, racism, high crime rates)^{5,6} and exhibit exaggerated blood pressure reactivity to behavioral stress.⁷ Since blood pressure ranking tracks from late childhood onward,⁸ African American adolescents with high-normal blood pressure are at increased risk for hypertension from childhood onward.⁹

Behavioral stress induces increased sodium retention. Normal sodium handling refers to the body's ability to restore sodium balance following cessation of stress. Impaired sodium handling has been implicated in the greater prevalence of hypertension in African Americans.¹⁰⁻¹² For example, acute laboratory behavioral stress studies have demonstrated that a substantial percentage of African

Americans retain sodium (impaired sodium handling) rather than exhibit the expected post-stress response of increased sodium excretion in response to stress-induced blood pressure increases.¹³⁻¹⁵ Sympathetic nervous system activation that occurs during stress to promote sodium retention plays a major role in this process.^{13,16-20} In addition, stress reduction may decrease sodium appetite, as indicated by decreased 24-hour urinary sodium excretion.²¹

Sympathetic hyperactivity has been implicated in the development of hypertension and cardiovascular disease complications.²² Stress-reduction practices, such as meditation, may decrease neurohormonal activity and help control the hypothalamic-pituitary-adreno-cortical axis and the renin-angiotensin-aldosterone system.²¹ Meditation can affect neuroendocrine status, metabolic function, and related inflammatory responses.²³ Meditation may stimulate the vagus nerve, thus enhancing parasympathetic output and shifting the autonomic nervous system balance from mainly sympathetic to parasympathetic. This shift causes favorable changes in cardiac-vagal function.²⁴ Programs such as Transcendental MeditationTM have shown decreased resting²⁵ and ambulatory blood pressure,²⁶ decreased cardiovascular reactivity to laboratory stress,²⁵ and decreased sodium excretion levels, suggesting decreased stress-activated salt appetite.²¹

There is a need for development and evaluation of an effective, easily disseminated primary prevention program for the school setting which can beneficially impact blood pressure and sodium

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