

# Associations between Home Remedy Use and a Validated Self-Reported Adherence Measure in an Urban African-American Population with Poorly Controlled Hypertension

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**Financial support:** This work was supported by the National Institutes of Health through a research career award (to JHY, K23RR16056), the American Heart Association through a Scientist Development Award (to JHY, 0130307N) and the Johns Hopkins General Clinical Research Center.

**Objective:** To determine associations between home remedy use and self-reported adherence among urban African Americans with poorly controlled hypertension.

**Methods:** A cross-sectional structured interview of African Americans admitted to medical units for uncontrolled hypertension at an urban academic hospital from 1999–2004. Logistic regression was used to test associations between home remedy use and self-reported adherence.

**Results:** One-hundred-eighty-three of 272 participants completed the study (67%); 39 (21%) reported using home remedies for hypertension. In a multivariate model, home remedy use was independently associated with greater medication adherence (OR for nonadherence=0.32, 95% CI: 0.14–0.75;  $p<0.01$ ) and dietary adherence (OR for changing diet=3.28, 95% CI: 1.10–9.81;  $p=0.03$ ), but not lifestyle or appointment adherence. These associations remained strong while controlling for age; sex; employment status; and key covariates, including greater medication side effects (OR=4.31; 95% CI: 1.64–11.3;  $p<0.01$ ), greater difficulty paying for medications (OR=2.94, 95% CI: 1.25–6.92;  $p=0.01$ ) and longer duration of diagnosis (OR for log years=1.53; 95% CI: 1.02–2.33;  $p=0.045$ ).

**Conclusion:** Home remedy use may be a marker of positive self-care for some hypertensive African Americans and not a promoter of nonadherence.

**Key words:** African Americans ■ hypertension ■ health behavior ■ urban population ■ minority health ■ complementary and alternative medicines

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## INTRODUCTION

African Americans experience the highest rates of hypertension in the United States, have greater difficulty achieving optimal blood pressure control than other groups and, therefore, have very high rates of adverse cardiovascular outcomes.<sup>1,2</sup> Many use unconventional therapies to self-treat their hypertension,<sup>3,4</sup> such as folk healing traditions and home remedies.<sup>5–13</sup> Home remedies are nonpharmacological self-administered healing approaches using common ingredients from everyday life that are often passed down through generations.<sup>14</sup> They can complement conventional care by encouraging self-care, or they can be used instead of conventional care.<sup>15,16</sup> The use of alternative therapies, including home remedies, should concern healthcare providers because of their uncertain impact on important health outcomes.

Despite the growing literature on health beliefs and behaviors in hypertensive African Americans, little is known about the relationship between home remedy use and adherence attitudes in African-American populations with hypertension. Brown and Segal found that African Americans' use of home remedies was associated with beliefs about efficacy, cost of medication and nonadherence to prescription medications.<sup>17</sup> A recent conceptual model hypothesizes that the use of unconventional therapies is associated with greater nonadherence in hypertension,<sup>18</sup> but this relationship has not been evaluated specifically for home remedies.

The objectives of this study were three-fold: 1) to describe the characteristics and self-reported adherence of those who use home remedies, 2) to describe differences in adherence and reasons for nonadherence between those who use home remedies and those who do not, and 3) to determine independent associations between home remedy use and adherence behaviors.

## METHODS

We analyzed baseline cross-sectional survey data from cases in the Inner City Hypertension and Body Organ Damage (ICHABOD) study, a case-control study

of severe, uncontrolled hypertension of hospitalized urban African Americans in Baltimore, MD. This project was reviewed and approved of by the Johns Hopkins Medicine institutional review board.

## Setting, Population and Sampling

We screened blood pressures of every patient admitted to medicine units at a large, urban, academic medical center in Baltimore, MD, during the periods of August 1999 to June 2001 and February 2002 to December 2004. We defined severe, uncontrolled hypertension as a systolic blood pressure  $\geq 180$  mmHg and a diastolic blood pressure  $\geq 110$  mmHg on two occasions in the emergency department, as measured using an automatic oscillatory device. We excluded patients with the following characteristics: 1) elevated blood pressure from known secondary causes, 2) age  $< 18$  years, 3) nonresidents of Baltimore, or 4) race/ethnicity other than African American. All remaining eligible patients were invited to participate. We wanted to sample patients who were at very high risk of adverse health outcomes related to poor hypertension control and whose use of home remedies as an alternative to conventional therapies may be especially problematic.

We screened 485 patients admitted with blood pressures  $> 180/110$ . Of these, 193 (40%) were ineligible for clinical reasons, including elevated blood pressure related to a secondary cause or inability to consent due to mental status changes. Seven percent of eligible patients died in the hospital before being enrolled. Of the 272 living and eligible patients, 191 completed the study (70%). Here, we report on 183 patients who completed the study and who had an existing diagnosis of hypertension prior to being admitted to the hospital.

## Instrument

We used a structured interview instrument to assess medical history, complications and knowledge of hypertension, as well as health habits, history of addiction, medications, adherence and access to care using items adapted from previous instruments.<sup>19,20</sup> All domains were assessed by medical personnel and community researchers familiar with this population. The instrument was field tested with a convenience sample of 10 community patients with hypertension to insure readability, clarity and cultural appropriateness of the content.

## Dependent Variable: Home Remedy Use

We asked about home remedy use with two two-part items—one to measure home remedy use for general health and one item to measure home remedy use specifically for hypertension—asked similarly to previously published items.<sup>17</sup> We first asked, “Do you use home remedies to treat your high blood pressure? Yes or No? If yes, what do you use?” Then, participants were asked, “Do you use home remedies for your general health? If

“yes,” what do you use?” Of note, due to the exploratory nature of these items, we deliberately did not define the term “home remedies” in the questionnaire. Rather, we merely presented the term and allowed the participants to use their own working definition.

## Independent Variables: Adherence

Self-reported adherence measures must be adapted to the specific circumstances of a study. For this study, we selected items from existing instruments and compiled and adapted them for our purposes.<sup>19,21</sup> We were interested in measuring self-reported adherence from four domains: medication-taking, diet, lifestyle and appointments. Self-report is a common, affordable but imperfect method to assess adherence behavior.

Study participants with poorly controlled blood pressure were identified on to the admission hospital. In order to assess the role that nonadherence played in precipitating hospital admission, we asked: “Had you missed taking your blood pressure pills before you came into the hospital?” To objectively validate the accuracy of our single item self-reported measure of adherence, we tested how well the item performed in 26 persons with hypertension using urine high-performance liquid chromatography (HPLC). Of these, eight were not informative because the subjects were prescribed blood pressure medication that was not detectable using HPLC (seven subjects) or were taking an unknown medication; one subject reported taking a “white pill.” Of the 18 informative subjects, nine reported being adherent and had the prescribed medication detected by HPLC (e.g., nine true positives). Seven patients reported being nonadherent and did not have any antihypertensive medications detected (seven true negatives). One person who reported being adherent did not have the medication identified by HPLC (e.g., one false positive). Interestingly, one patient who reported being nonadherent did have the prescribed medication in their urine (one false negative). Therefore, our question was 90% sensitive and 87.5% specific for adherence. The positive predictive value of reporting adherence was 90%, and the negative predictive value of reporting nonadherence was 87.5%. In other words, 90% of those who said they were adherent were in fact adherent, and 87.5% of those who said they were nonadherent were nonadherent. This analysis suggests that the single-item adherence measure used in the current study accurately classified participants’ adherence levels prior to hospitalization. For clinical use or for use in other settings, however, further studies are needed to confirm the validity and utility of this measure for assessing adherence among patients admitted to the hospital with poorly controlled blood pressure.

Dietary adherence was measured by asking a series of questions related to whether participants ate certain foods, added salt to their food or had initiated dietary changes since being given the diagnosis of hypertension. Lifestyle and appointment adherence were also measured by asking nonjudgmental questions for these domains.

## Covariates: Reasons for Nonadherence

In addition to measuring medication adherence, we asked seven questions designed to determine participants' reasons for nonadherence, including problems with affordability, forgetting, perceived inefficacy, doctor availability, getting to the pharmacy, dosing frequency and side effects (12 participants did not fully complete this section).

## Data Collection and Management

Research assistants trained to pose, (and if necessary) clarify study questions administered the instrument face-to-face in a standardized manner. They implemented the questionnaire in a non-judgmental fashion to optimize participant disclosure of adherence and other lifestyle behaviors. Research assistants stressed that a doctor would not be informed of their answers and that their responses were confidential. Responses from all interviews were double entered into a secure electronic database and checked with the original interview record to resolve any inconsistencies.

## ANALYSIS

Associations between nonadherence and home remedy use (i.e., unconventional therapies) for hypertension and other key covariates from a published conceptual model were tested.<sup>18</sup> (Figure 1).

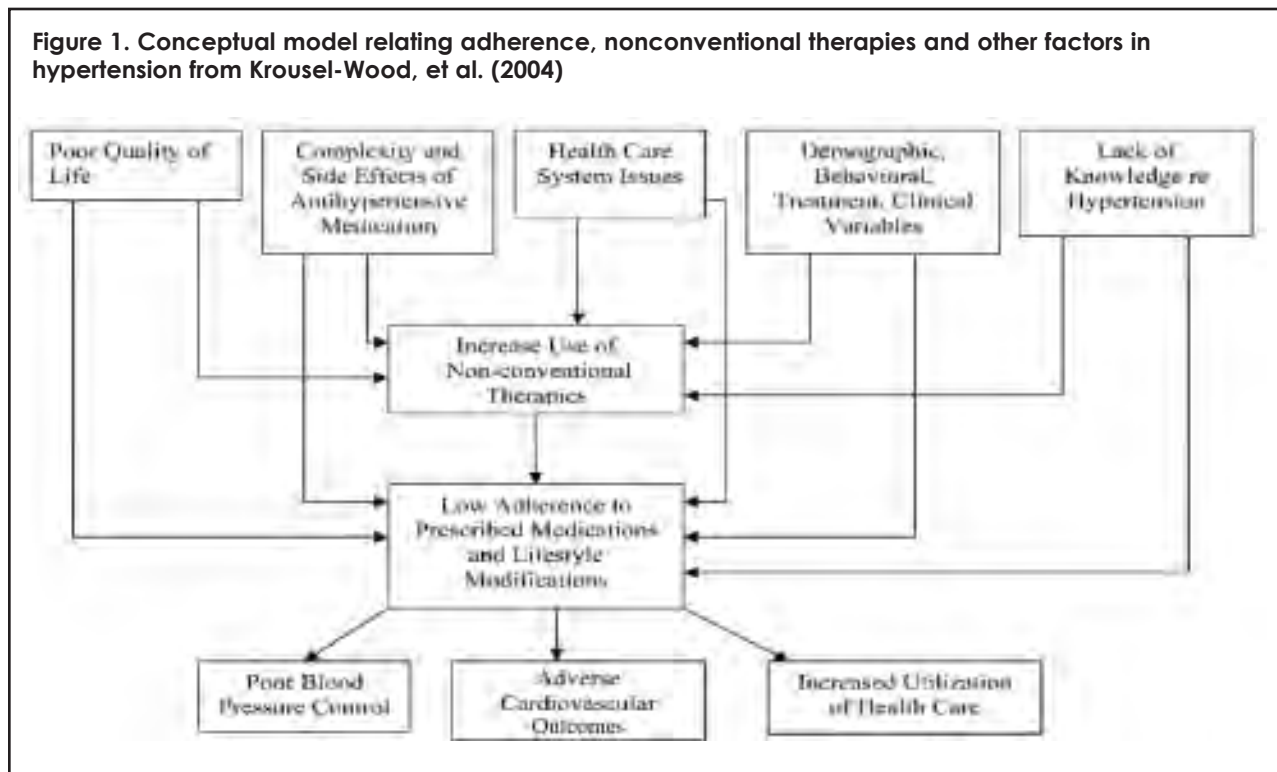
We used a three-step data analysis process. 1) We examined unadjusted associations between home remedy use and the four adherence domains, reasons for medication nonadherence, as well as demographic, clinical,

health behavior and access to care variables using Student's t test (comparison of means for nonnormally distributed continuous variables), Kruskal-Wallis test (comparison of median values for continuous variables) or  $\chi^2$  test (dichotomous variables) 2) We then assessed the independent association of home remedy use with promising candidate variables from each of the four adherence domains—medication, diet, lifestyle, appointments, adjusting for age and gender. Candidate adherence variables and key covariates that remained promising ( $p < 0.20$ ) in this analysis were carried forward in the subsequent model. 3) Finally, we tested associations between candidate adherence variables and home remedy use after adjusting for key covariates using multivariable logistic regression. The final regression model used data from the 171 patients on whom we had complete data (including reasons for nonadherence).

## RESULTS

Overall characteristics of the 183 participants are shown in Table 1. Thirty-nine (21%) reported using a home remedy specifically for their blood pressure. The two most common remedies used for hypertension were vinegar and garlic (used by 31 and 19 participants, respectively). Eighteen participants reported using home remedies for their general health. Most common home remedies used for general health were baking soda (five) and vitamin/mineral supplements (10). Here, we focus on the results related to the 39 participants who reported using of home remedies taken for blood pressure.

**Figure 1. Conceptual model relating adherence, nonconventional therapies and other factors in hypertension from Krousel-Wood, et al. (2004)**



## Associations with Home Remedy Use, Unadjusted

Home remedy users and nonusers were similar in most respects, including demographics, severity of disease, health knowledge and insurance status (Table 1). However, those who used home remedies reported a longer duration of diagnosis ( $p<0.01$ ) and trended toward less employment ( $p=0.10$ ), more hypertension knowledge ( $p=0.08$ ) and greater difficulty paying for medications ( $p=0.10$ ).

Those who reported using home remedies also reported greater adherence to medications, diet and lifestyle (Tables 2 and 3). Greater dietary adherence was present for multiple items, including adding salt, eating canned foods, eating deli meats and reporting dietary change since being diagnosed. Home remedy users were more likely to report trying to lose weight and more frequently reported exercising  $\geq 3$  times per week, but these results did not reach significance. Adherence to appointments was greater among home remedy users but did not reach statistical significance ( $p=0.15$ ). Notably, while home remedy users reported greater medication adherence (Table 2), they reported more frequent side effects to medication as a reason for nonadherence (Table 3).

## Associations between Home Remedy Use and Four Adherence Domains

Age- and gender-adjusted logistic regression examin-

ing the association between home remedy use and candidate variables from each of the four adherence domains suggested greater medication adherence among home remedy users (OR for nonadherence=0.41;  $p=0.02$ ). Adherence to diet and medications met our criteria ( $p<0.20$ ) for inclusion in the subsequent larger model (Table 4). Home remedy use was not associated with differences in lifestyle (OR for trying to lose weight=1.27;  $p=0.46$ ) or appointment adherence (OR for number of missed appointments= 1.02;  $p=0.79$ ).

## Home Remedy Use and Adherence, Adjusting for Key Covariates

Multivariable logistic regression showed that home remedy use continued to be independently associated with greater medication adherence (OR for nonadherence=0.32, 95% CI: 0.14–0.75;  $p<0.01$ ) and dietary adherence (OR for changing diet=3.28, 95% CI: 1.10–9.81;  $p=0.03$ ) (Table 5). These associations remained strong while controlling for age, sex, employment status and key covariates identified from earlier steps in the analysis. These covariates included reporting greater medication side effects as a reason for nonadherence (OR=4.31, 95% CI: 1.64–11.3;  $p<0.01$ ), greater difficulty paying for medications (OR=2.94, 95% CI: 1.25–6.92;  $p=0.01$ ) and longer duration of diagnosis (OR for log years=1.53, 95% CI: 1.02–2.33;  $p=0.045$ ).

**Table 1. Baseline characteristics, stratified by home remedy use, among 183 severely hypertension African Americans\***

Variables	Overall N=183	Nonhome Remedy N=144	Home Remedy N=39	Significance Level
Demographics				
Age	50.9 (12.2)	50.4 (12.2)	52.7 (11.9)	0.30
Sex (female)	55.2%	54.2%	59.0%	0.59
Employed (full- or part-time)	29.1%	33.3%	20.0%	0.10
Finished high school	53.9%	55.2%	48.7%	0.47
Mean monthly income (\$)	832 (1048)	852 (1050)	756 (1051)	0.63
Clinical Severity				
Number of admissions in 5 years	4.0 (4.1)	4.1 (4.3)	3.7 (3.4)	0.62
Mean average systolic BP (mmHg)	201.7 (18.8)	202.1 (18.6)	200.0 (19.2)	0.53
Mean average diastolic BP (mmHg)	122.9 (13.8)	122.6 (14.2)	124.2 (11.9)	0.51
Median duration of diagnosis (years)	14.6 (12.0)	13.3 (11.2)	19.0 (13.5)	<0.01
End organ damage	63.2%	62.9%	64.1%	0.89
Hypertension Knowledge				
Mean number of hypertension risks named	1.8 (1.0)	1.8 (1.0)	2.1 (0.9)	0.08
High-Risk Health Behaviors				
Current smoking	51.9%	52.1%	51.3%	0.93
Current cocaine use	18.7%	18.2%	20.5%	0.74
Current heroin use	18.2%	18.2%	18.4%	0.97
Current heavy alcohol use	10.7%	11.4%	8.1%	0.57
Healthcare Access				
Have insurance	67.6%	69.2%	61.5%	0.36
Difficulty paying for medications	52.5%	49.3%	64.1%	0.10
Have primary care provider	70.9%	71.3%	69.2%	0.80

\* Continuous variables reported as means (standard deviation). Counts of dichotomous variables reported as a percent.

## DISCUSSION

In this analysis, high-risk patients with poorly controlled hypertension commonly reported using home remedies for hypertension. This behavior was independently associated with greater medication and dietary adherence even after controlling for key covariates (side effects, duration of diagnosis and difficulty paying for medications). It was not independently associated with differences in lifestyle or appointment adherence.

The use of garlic and vinegar for medicinal treatment of hypertension is consistent both with anecdotal reports

of local investigators studying hypertension in Baltimore and with similar populations in the southern United States.<sup>4,13,17,19,22</sup> To our knowledge, no literature assesses the efficacy of vinegar for treatment of hypertension. However, there are some potential, rare adverse physiological effects.<sup>23,24</sup> On the other hand, garlic has been better characterized for cardiovascular disease.<sup>25,26</sup> It is considered safe, appears to have favorable effects on blood viscosity and platelet aggregation, and shows modest positive effects on blood pressure control. Given this evidence, an effectiveness trial examining the impact of garlic and vin-

**Table 2. The unadjusted association of medication, diet, lifestyle and appointment adherence with home remedy use among 183 severely hypertensive African Americans**

Items	Overall N=183	Nonhome Remedy N=144	Home Remedy N=39	Significance Level
Medication Adherence				
Had you missed taking your blood pressure pills before you came into the hospital?*	71.0%	75.7%	53.9%	<0.01
Dietary Adherence				
Do you add salt to your food?	48.6%	52.5%	34.2%	0.05
Fast food $\geq 1$ per week	58.8%	60.8%	51.3%	0.28
Fried food $\geq 1$ per week	79.7%	81.1%	73.4%	0.35
Canned food $\geq 1$ per week	61.3%	64.1%	51.3%	0.15
Deli or lunch meats $\geq 1$ per week?	74.7%	78.3%	61.5%	0.03
Have you talked to a nutritionist or dietician since you were told that you had high blood pressure?	58.8%	59.4%	56.4%	0.73
Has a doctor or nurse told you to cut down on salt or salty foods?	89.6%	88.9%	92.3%	0.54
Have you changed your diet since you were told that you had high blood pressure?	72.7%	69.4%	84.6%	0.06
Lifestyle Adherence				
Have you tried to lose weight?	41.2%	39.2%	48.7%	0.28
Exercise $\geq 3$ times per week	36.8%	35.0%	43.6%	0.32
Appointment Adherence				
Typically miss $\geq 1$ out of 10 doctor's appointments	61.2%	63.9%	51.3%	0.15

\* Only includes participants who had been previously diagnosed with high blood pressure (N=183)

**Table 3. The association of reasons for medication nonadherence with home remedy use among 171 severely hypertensive African Americans previously prescribed medication for high blood pressure\***

Items	Overall N=171	Nonhome Remedy N=135	Home Remedy N=36	Significance Level
Do you ever miss your pills because you can't afford them?	39.8%	39.3%	41.7%	0.79
Do you ever forget to take your medicine?	40.9%	43.0%	33.3%	0.30
Do you ever not take your blood pressure pills because you don't think that they're helping you?	14.6%	14.1%	16.7%	0.70
Do you ever miss your medication because you can't find a doctor to prescribe it?	14.6%	12.6%	22.2%	0.15
Do you ever miss your medicine because you have trouble getting to the pharmacy to get it?	18.1%	17.0%	22.2%	0.47
Do you ever miss your medicine because you have to take it too many times a day?	9.4%	10.4%	5.6%	0.38
Do you ever miss your medicine because of side effects?	18.7%	14.8%	33.3%	0.01

\* Only includes participants who had been previously diagnosed with high blood pressure (N=183) and who had complete data for this set of questions (N=171)

egar on blood pressure and adherence compared to other hypertension treatment modalities may be warranted, especially in inner-city African-American populations.

This constellation of findings confirms the association of multiple social factors with adherence behavior of patients with hypertension.<sup>18</sup> However, contrary to other studies, these results suggest that home remedies may not contribute to adherence behavior in the same manner as other unconventional therapies. Rather, home remedy use may reflect a propensity toward positive self-care in a relatively motivated subgroup of patients with long-standing hypertension. From these results we speculate (but cannot causally establish from these data) that for the patient who desires to adhere to conventional dietary and medication recommendations but is faced with perceived economic (difficulty affording prescriptions) and psychosocial barriers (including side effects to medications) to conventional treatment, home remedies present an available and culturally palatable option for coping with a severe chronic condition. And conversely, the common belief among healthcare providers that all alternative therapies should be avoided is not supported by these data. Rather, healthcare providers who serve diverse populations must provide a context in which patients feel comfortable disclosing the full range of health-related

behaviors—some of which may promote their health in an “unorthodox” manner. Further work needs to be done examining the best approaches to eliciting the use of alternative remedies among diverse populations.

## LIMITATIONS

This population from inner-city Baltimore has distinct cultural origins and distinctive cardiovascular morbidity that may not be identical to other urban African-American populations, making it difficult to generalize to other populations. These data do not give a comprehensive picture of unconventional therapy use in this population. We measured home remedy use alone by self-report using two simple item measures without assessing dosages or formulations (food versus supplement forms). Nevertheless, the associations with home remedy use specifically for hypertension suggest a more comprehensive assessment of unconventional therapies in this population may be warranted. Difficulties in language and terminology or fear of stigma may have biased participants toward underreporting home remedy use despite our efforts to ensure complete and nonjudgmental responses from participants.

Furthermore, self-reported measures of adherence are limited. These limitations can include social desirability and recall biases and overly optimistic estimates of behav-

**Table 4. The independent association of adherence with home remedy use among severely hypertensive African Americans previously diagnosed with high blood pressure (N=183). All factors, plus age and gender, included in a single model**

Variables	OR	95% CI	Significance Level
Medication Adherence			
Missed meds prior to coming to the hospital	0.41	0.19–0.89	0.02
Dietary Adherence			
Changed diet since being diagnosed	2.10	0.80–5.53	0.13
Lifestyle Adherence			
Have you tried to lose weight?	1.27	0.60–2.67	0.46
Appointment Adherence			
Out of every 10 appointments, on average how many do you miss?	1.02	0.88–1.18	0.79

**Table 5. The association of adherence with home remedy use adjusting for age, sex, duration of diagnosis, difficulty paying for medication and side effects of medication among severely hypertensive African Americans with complete questionnaire information (N=171)**

Variables	OR	95% CI	Significance Level
Adherence (2 Domains)			
Missed meds prior to coming to the hospital	0.32	0.14–0.75	<0.01
Changed diet	3.28	1.10–9.81	0.03
Demographics			
Age	1.02	0.99–1.06	0.17
Sex	1.28	0.56–2.94	0.56
Employed	0.88	0.33–2.31	0.79
Key Covariates			
Duration of hypertension diagnosis (log years)	1.53	1.02–2.33	0.045
Difficulty paying for medications	2.94	1.25–6.92	0.01
Side effects to hypertension medication	4.31	1.64–11.3	<0.01

ior. Although our adherence measures seemed to perform well in relation to biological markers of adherence, further validation of cross-sectional adherence measures in this population may be warranted. Furthermore, these associations from a cross-sectional analysis cannot establish causal relationships. Rather, these relationships point to potential key relationships in the health behavior of a high-risk population that deserves more attention in future research.

## CONCLUSION

The use of home remedies was common in this population of patients with uncontrolled hypertension. Home remedies may serve as one pragmatic self-care approach that diverse, inner-city populations use to remain proactive about their health despite the limitations of their socioeconomic context. As such, home remedy use may be relevant to adherence behavior in population-based hypertension research. Better describing the relationship between home remedies and adherence in future research may be important for sustainable community-based hypertension control interventions for African Americans.

## ACKNOWLEDGEMENTS

We would like to thank Cynthia Rand, PhD, and Maureen George, PhD, for their valuable feedback on early drafts of the manuscript.

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## C A R E E R O P P O R T U N I T Y

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