

Hypertension Diagnosis and Physician Consult to Reduce Salt Intake

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ABSTRACT

Background: Hypertension is a pertinent global health issue with increased prevalent contributing factors such as lack of physical activity, increased BMI levels, and poor nutritional choices. Compared to other ethnicities, African Americans are more likely to be diagnosed with hypertension, more likely to have untreated hypertension, and more likely to suffer adverse clinical consequences from uncontrolled hypertension. As much as 30% of all deaths due to hypertension in African American men and 20% in women can be contributing to high blood pressure.

Objective: The purpose of this study is to explore whether African Americans with and without hypertension are given proper consultation to reduce salt intake based on hypertension diagnosis from their physician.

Methods: Data was analysed from the 2015 BRFFS data, a United States health survey that looks at behavioural risk factors. Analysis was restricted to 4,476 non-Hispanic African American participants with and without hypertension diagnosis and salt reduction recommendation at baseline. Hypertension and salt reduction recommendations were assessed using self-reported high blood pressure and salt reduction measurements at baseline. Logistic regression analysis was used to examine the differences of hypertension and the impact of physician recommendation on reduced salt intake.

Results: Compared to self-reported data of hypertension awareness, those aware of their hypertension were more likely to be women than men (58% vs 42% respectively). Adjusted differences showed those who were aware of their hypertension were not given proper consult to reduce salt intake compared to those who did receive proper consult (OR=7.53; confidence interval [CI] 5.92-9.59; p<0.001).

Conclusion: In conclusion, our results suggest that physicians can play an important role in reducing racial/ethnic disparities in hypertension control. Additionally, the study highlights the need for testing an intervention aimed at increasing provider awareness of disparities within the local health setting to improve hypertension control for high risk patients.

INTRODUCTION

Hypertension (HTN) is a pertinent global health issue with increased prevalent contributing factors such as lack of physical activity, increased BMI levels and poor nutritional choices^[1]. Hypertension is defined as having elevated systolic blood pressure ≥ 140 mm Hg and/or diastolic blood pressure ≥ 90 mm Hg compared to normotensive systolic blood pressure <120 mm Hg and diastolic blood pressure <80 mm Hg. Close to one-third of the adult United States population is considered to have hypertension with elevated blood pressure levels^[2]. Poor hypertension control can exacerbate over time and lead to co-morbidities such as diabetes mellitus, chronic kidney disease and renal failure. High blood pressure is an independent risk factor for adverse cardiovascular and renal outcomes and therefore controlling this health issue is important^[3].

Currently, prevalence per 100,000 is far greater among African Americans (34.2) compared to the overall ethnic cases

(28.5), which leads to worse health outcomes^[4,5]. In 2009 the overall death rate per 100,000 due to hypertension was reported as 18.532. Death rates for African American men and women, however, were reported as 51.6 and 38.3 per 100,000, respectively compared to their Caucasian counterpart who faced substantially lower death outcomes of 17.4 and 14.4 per 100,000³². These statistics clearly display a gap in hypertension diagnosis and control among the African American community that must be addressed^[6]. According to the American Heart Association, the annual incidence of heart failure in Caucasians is 6 per 1,000 person-years, compared to African Americans with 9.1 per 1,000 person-years, a 51.7% increase^[7]. The Atherosclerosis Risk in Communities study also noted an increase of heart failure between Caucasians and African Americans of 1.0 and 4.6 per 1,000 person-years respectively^[8]. The disproportionality in overall mortality between African Americans and Caucasians is due in part to the burden of HTN in the African American community. As much as 30% of all deaths due to HTN in African American men and 20% in women can be contributing to high blood pressure^[9]. Therefore, African Americans should be properly educated about behaviors that increase their risk of developing high blood pressure such as high salt intake, dietary fats, inactivity etc.

Salt sensitivity is defined as a change in the blood pressure in response to changes in salt and water homeostasis. Understanding the mechanism or mechanisms that influence salt sensitivity may profoundly advance our understanding of pathophysiology in hypertensive African American men and women. Furthermore, the Reasons for Geographic and Racial Difference in Stroke (REGARDS) study has documented and legitimized the racial and geographical differences in awareness, treatment and control of hypertension^[10-12]. Due to the increased risk for cardiovascular events occurring earlier in life, clinical biomarkers associated with hypertension that are known to be prevalent in at risk patients should be recognized and addressed^[13]. It is imperative that clinical practice guidelines focused on management of HTN in African Americans be practical for healthcare providers in order to impact the public health of this high-risk group. The purpose of this study was to explore whether African Americans with and without hypertension are given proper consultation to reduce salt intake based on the recommendation from their primary care physician.

METHODS

The Behavioral Risk Factor Surveillance System BRFSS is the nation's leading catalog of health related telephone surveys that collect comprehensive state data about United States residents regarding their health related risk behaviors, chronic health conditions, and use of preventive services. The BRFSS is an ongoing, state-based, random digit-dialed telephone survey of non-institutionalized adults aged 18 years or older. This system was established in 1984 with only 15 states but currently collects data in all 50 states as well as the District of Columbia and three U.S territories. The BRFSS study has been approved by Human Research Review Boards from state departments of health. To date, the BFRRS has completed more than 400,000 adult interviews each year, making this the largest continuously conducted health survey system in the world^[14].

The BRFSS participants presented in the study included an initial sample of 441, 456 subjects as seen in **Figure 1**. We excluded those within the sample who did not report being non-Hispanic African Americans which brought our sample to 34,346. Of those left within the eligible study population, only non-Hispanic African Americans who had valid data on physician consult of reduced salt and a proper hypertension diagnosis were included. We further excluded 34 subjects who had invalid salt reduction data. These exclusions left an analytic sample of 4,476 participants for analysis which was 13.03% of the eligible population. We evaluated the salt reduction adjusted odds ratio of all variables and tested for hypertension vs. no hypertension differences using logistic regression. We then examined salt reduction outcome and hypertension exposure, sequentially adjusting for the covariates. One must note that this questionnaire module was only asked in selected states and territories which would account for the discrepancy of low eligible participants. These include Alabama, Indiana, Iowa, Kentucky, North Carolina, Tennessee and Puerto Rico.

STUDY MEASURES

Hypertension Diagnosis

'Hypertension diagnosis was assessed operationally and used from the data presented in the 2015 BRFFS. Hypertension was operationally defined as self-report of high blood pressure (a positive response to "Has a doctor or other health professional ever told you that you have high blood pressure?" including those told of hypertension only during pregnancy defined as a positive response to "Was this only when you were pregnant?" which was asked only of women). Conceptually, we defined our exposure as those with and without hypertension diagnosis. Participants within our study who were self-reporting their hypertension were considered as "aware" of the condition which we used as our conceptual definition. Population 1 and 2 were grouped as being diagnosed as hypertensive for our operational definition question. This included men and women with diagnosed hypertension and women who were only hypertensive through pregnancy. Gestational hypertension was included within this population based on previous literature of lingering hypertension post-partum^[15]. We also grouped population 3 and 4 as not being hypertensive. This included those who were not hypertensive and borderline hypertensive.

Physician Consult on Salt Intake

Physician’s consultation to reduce salt was assessed operationally from data in the 2015 BRFSS. Our operational definition used to address this was “Has a doctor or other health professional ever advised you to reduce sodium or salt intake?” Conceptually, we defined our analytic outcome as advice from doctor or health care provider to reduce salt intake. We concluded that group 1 from our outcome variable will be noted as a “yes” to physician consult on salt reduce. Group 2 was categorized as a “no” to physician consult to reduce salt intake.

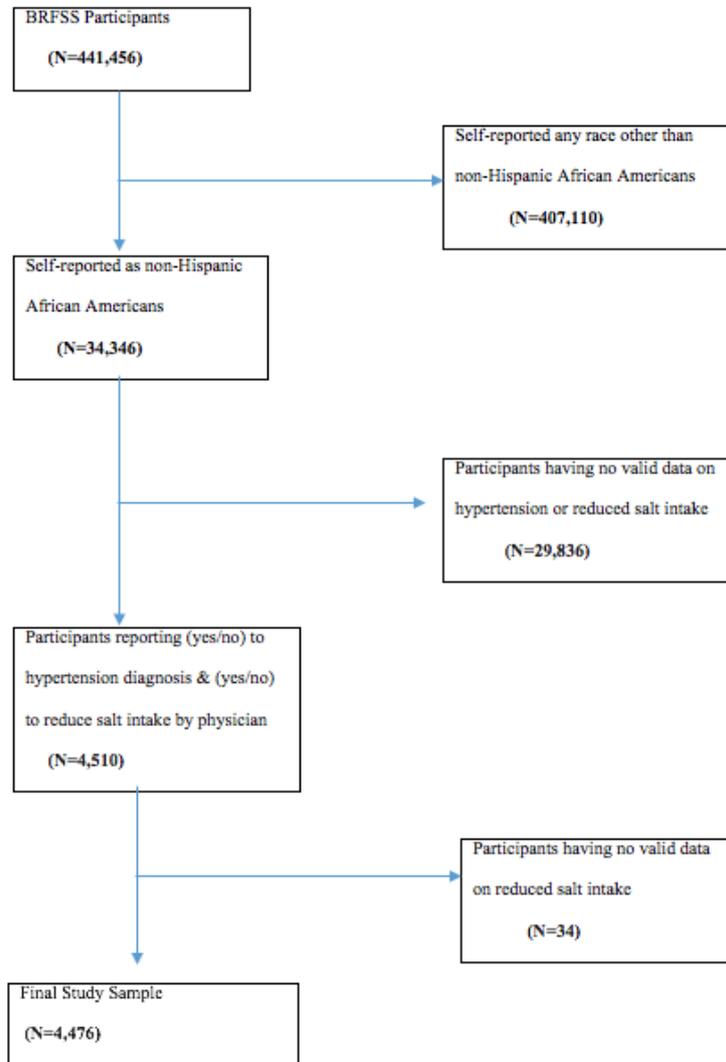


Figure 1. Analytical sample.

Potential Confounders

A confounder is an unobserved exposure where the effects of the exposure on a given outcome are mixed in with other factors that result in a distortion of the true relationship [16]. Variables that could potentially confound the relationship between hypertension diagnosis and reduced salt intake were categorized into 5 classes. Marital status (married and never married, sex(male/female) and age (18-34 years, 35-64 years, 65+ years) were used as demographic variables. Level of education (did not graduate high school, graduated high school and attended some college/technical school, graduate college/technical school) and family income (<50,000 and >\$50,000), were used as variables to define socioeconomic status. These confounders were deemed important within the study population due to fact that hypertension awareness and reduced salt intake could show a false association to the desired outcome in the study based on a previous literature [17]. Identifying these confounding variables allows us to rule out many of them by showing that some of these distorted conditions do not hold true. Other risk factors that were considered to be potential confounders but were not included within our study were body mass index (BMI), (categorized as normal, overweight or obese), home ownership (categorized by the question “Do you own or rent your home?” into own, rent or other arrangement), health insurance status (was there a time in the past 12 months when you needed to see a doctor but could not because of costs?) and alcohol consumption (yes/no).

STATISTICAL ANALYSIS

Data analyses were conducted using STATA SE version 14 software package (StataCorp, 4905 Lakeway Drive College Station,

Texas 77845-4512 USA) [18]. Our approach was to assess non-Hispanic African American self-reported data on hypertension diagnosis compared to our outcome (physician consult to reduce salt). First, we compared demographic characteristics of participants within our analytic sample by hypertension status (i.e., Yes- hypertensive and non-hypertensive). Second, we compared physician recommendation on reducing salt intake against the same hypertension status. This analysis showed the reported weighted percent of the variates in **Table 1**. Bivariate analyses of physician consult to reduce salt, relevant demographic variables, and covariates were conducted to assess the distributions across hypertension diagnosis. Many State commands estimate the parameter of a process or population by using sample data. Some of these estimated commands use the command “svy” to produce results that are appropriate for complex survey data and produce proper estimations for the sample population.

Our analysis was carried out using logistic regression. A logistic regression model was used to determine the unadjusted relationship between the hypertension and physician consult to reduce salt. Multivariable logistic regression was then conducted to compare hypertension and physician consult, while adjusting for covariates. We utilized an odds ratio model to show measured effects between our exposure and outcome. We hypothesized that having a hypertension diagnosis show an increased odd of being told to reduce salt intake. We built an unadjusted odds model by exploring the relationship between the outcome and covariates. Once a baseline analysis was obtained, in order to get the adjusted model, we utilized a backward elimination regression analysis with all of our variables at a 0.05 alpha level excluding the reference groups.

RESULTS

In this study, we studied 4,476 participants from the BFRRS data set. The baseline socioeconomic and demographic risk factor characteristics of participant’s hypertension diagnosis are shown in **Table 1**. Those who were hypertensive were more likely to be female compared to those who were not hypertensive (58%, 62.5% respectively). Among those who were hypertensive, 65.0% of the participants were between ages between 35-64 years of age compared to 45.0% who were not hypertensive. Those with hypertension and married accounted for 31.8% compared to those who were married without hypertension (31.1%). 63.0% of those with hypertension self-reported as graduating high school and attending some college/technical school compared to the 70.0% of the non-hypertensive group. Income of less than \$50,000 accounted for 82.0% of the hypertension group compared to 77.0% of the non-hypertensive groups.

Those who reported as “yes” within our analytic study were attributed a 57% prevalence rate vs. those who reported “no” as 43%. Those whom were hypertensive and told to reduce salt intake comprised of 61% of the population. Aversely, those with the same hypertension but were not told to reduce salt intake comprised of merely 14% of the population.

Table 1. Comparison of hypertension diagnosis against demographic and socioeconomic variables: Behavioral risk factor surveillance system, United States, 2015.

	Hypertension: Yes N=2644	Hypertension: No N=1832
Salt Reduction		
Yes	61.0% N=1603	14.0% N=317
No	39.0% N=1041	86.0% N=1515
Sex		
Male	42% N=818	37.5% N=687
Female	58% N=1826	62.5% N=1145
Age		
18-34 years	9.0% N=133	49.0% N=604
35-64 years	65.0% N=1523	45.0% N=996
65+ years	26.0% N=988	5.7% N=232
Marital Status		
Married	31.8% N=841	31.1% N=570
Never Married*	67.8% N=1,793	68.9% N=1262
Education Level**		
Did not graduate	23.0% N=442	12.0% N=155
Graduated high school and attended some college/technical school	63.0% N=1650	70.0% N=1,124
Graduated College/Technical School	15.0% N=552	19.0% N=497
Income Level***		
<\$50,000	82.0% N=2,206	77.0% N=1,393
>\$50,000	19.0% N=438	23.0% N=441

*Includes no longer married

* Missing/do not know/refused were included in the did not graduate category

* * Missing/don’t know/refused were included in the <\$50,000 category

Table 2 shows unadjusted and adjusted OR for the outcome of interest. The most notable were among income level, marital status and hypertension diagnosis after adjusting the models. The unadjusted model for those earning greater than \$50,000 had a higher odd of being told to reduce salt intake (OR: 1.32, 95% CI, 1.198-1.446 p=0.028). Those reporting earnings greater than \$50,000 in the adjusted model were also at higher odds of not being told to reduce salt intake (OR: 1.32, 95% CI, 1.198-

1.446; p=0.028). Those reporting earnings greater than \$50,000 in the adjusted model were also at higher odds of not being told to reduce salt intake (OR: 1.51, 95% CI, 1.062–2.143; p=0.022). Additionally, those who reported as never being married had similar odds of not being told to reduce salt intake in the adjusted model (OR: 1.362, 95% CI, 1.00–1.845; p=0.049). Other demographic variables such as age and sex reported adjusted and unadjusted odds ratios that were lesser than or equal to one which could indicate those variables are not associated or there is a negative association in relation to the outcome. Interestingly, of the 4,644 participants, unadjusted odds for those who have hypertension and were told to reduce salt intake were reported as 9.28 (95% CI, 1.198-1.446; p<0.001) However, after adjusting the odds ratio model, we found that those with the same hypertension diagnosis were 7.54 (95% CI, 1.198-1.446; p=0.001) times the odds of not being told to reduce their salt intake.

Table 2. Odds ratios of salt reduction counseling by physician outcomes: Behavioral risk factor surveillance system, United States, 2015.

Characteristics	Unadjusted OR (95% CI)	P value	Adjusted OR (95% CI)	P value
Hypertension				
Yes	9.28 (7.43-11.58)	<0.001	7.539 (5.924-9.593)	<0.001
No	Referent	Referent	Referent	Referent
Sex				
Male	Referent	Referent	Referent	Referent
Female	0.877 (0.810-0.949)	0.163	0.874 (0.692-1.103)	0.0259
Age				
18-34 years	Referent	Referent	Referent	Referent
35- 64 years	0.17 (0.152-0.194)	<0.001	0.173 (0.121-0.247)	<0.001
65+ years	0.045 (0.039-0.052)	<0.001	0.072 (0.046-0.113)	<0.001
Marital Status				
Married	Referent	Referent	Referent	Referent
Never Married	2.451 (2.228- 2.696)	<0.001	1.362 (1.000 - 1.854)	0.049
Education Level*				
Did not graduate	0.447 (0.391-0.510)	<0.001	0.590 (0.387-0.901)	0.015
Graduated high school and attended some college/technical school	0.822 (0.753-0.897)	0.005	0.888 (0.679- 1.16)	0.038
Graduated College/Technical School	Referent	Referent	Referent	Referent
Income Level				
<\$50,000	1.0 Referent	Referent	Referent	Referent
>\$50,000	1.32 (1.198-1.446)	0.028	1.509 (1.062-2.143)	0.022

DISCUSSION

Literature and clinical data continues to show that hypertension-related complications are higher in minorities and hypertension control remains inadequate in minority populations [22]. The results of our study are consistent with numerous studies, who reported on hypertension management and control, along with potential guidelines to physicians of salt reduction in high risk populations [23-25]. Similarly, results found in literature from a study done by Kola reported that physicians need to understand that certain high risk groups need different therapeutic approaches such as reduced salt intake and increased potassium aside from normal pharmacological method [26]. The ability to control blood pressure has the potential to reduce mortality, save healthcare costs, and save millions of lives each year for these high risk populations. For this reason, Healthy People 2020 and the Centers for Disease Control have made control of hypertension and the elimination of disparities in hypertension control a priority [27].

Reducing the health disparities gap among African Americans with hypertension requires a multilevel approach using effective population management strategies. Leadership, vision, focus, and commitment to improve blood pressure control are essential to support quality and performance improvement programs. Literature has shown that some healthcare providers recognized that racial/ethnic and socioeconomic disparities in hypertension control exist in the US health system, but only slightly more than one third reported disparities in care among patients they personally treat [28]. Our results suggest that physicians hold the potential to reduce these racial and ethnic disparities among hypertension control that affects certain groups.

Health-care system-based approaches are equally as important in reducing hypertension disparities given the differences in health outcomes that persist among race-ethnic groups secondary to institutional barriers. Effective approaches to reducing disparities due to institutional barriers include cultural competency training and data-based quality improvement efforts [29]. It is possible that that healthcare provider attitudes, training and perceptions may be an important contributor to the lack of hypertension control. This study also highlights the need for testing an intervention aimed at increasing provider awareness of disparities within the local health setting to improve hypertension control for minority patients. Continued research provides evidence revealing that the health of individuals of African Americans, in relation to hypertension, varies across regions of the U.S [30]. These differences highlight the importance of socio structural determinants of health that can most effectively be addressed at local and national policy levels to reduce these health disparities in the U.S.

LIMITATIONS

Our study does have some limitations. For one, our sample population was limited as the module that was asked only appeared in a certain amount of states and territories. If asked in more states and territories, our results could have yielded more precise results. Additionally, since the BRFFS contains self-reported data via telephone survey, our finding could have been confounded due to recall or social desirability bias among participants. A number of studies have shown that the telephone and non-telephone populations are different with respect to demographic, economic, and health characteristics^[19-21]. Furthermore, our study design did not include a comparison group of another racial/ethnic background which could have given more validity to the results.

CONCLUSION

Although over the year's hypertension awareness has increased, non-Hispanic African Americans in the US have a significantly higher prevalence of hypertension^[31]. Continued effort to understand and intervene upon the multifaceted reasons as to why hypertension disparities exist among certain populations is central to providing hypertension specialty care. Additional research attention and funding directed at examining variability in health among African Americans will help to pinpoint relevant policies and public health strategies for reducing disparities and improving health among this high risk population.

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