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PRESCRIBING PATTERNS IN THE TREATMENT OF HYPERTENSION AMONG UNDERSERVED AFRICAN AMERICAN ELDERLY

Introduction: Hypertension among African Americans is higher compared to Whites and has an early onset, greater severity, and is associated with more organ damage. We examined whether pharmaceutical treatment of hypertension among underserved African American elderly is consistent with the current treatment guidelines and whether treatment variations occur due to existing co-morbidities among the hypertensive.

Methods: Our study surveyed 400 African Americans, aged ≥ 65 years, recruited from 16 predominantly African American churches located in South Los Angeles. The study used face-to-face interviews which documented type, frequency, and dosage of all medications used by participants. Label information of each drug was recorded.

Results: Our data indicate: 1) 29% were on one anti-hypertensive medication; 60% were taking 2–3 medications; and 9% were on four classes of anti-hypertensive medication; 2) among the elderly taking a combination of two or more drugs, ACE or ARB was used 76% in combination of agents, diuretics 60%, calcium channel blockers 63%, and beta-blocker 61%; and 3) 26% of the elderly were taking ≥ 3 medications including a diuretic.

Conclusions: Treatment of hypertension appears to be inconsistent with the prevailing treatment guidelines for nearly one-third of the aged African Americans. Further investigation is needed to determine why a significant number of individuals from this under-served population are not receiving care based on established clinical guidelines. (*Ethn Dis.* 2014;24[4]:431–437)

Key Words: Resistant Hypertension, African American, Elderly, Medication

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INTRODUCTION

Hypertension (HTN) has been identified as one of the risk factors that contribute to cardiovascular events such as heart attacks, heart failure, and stroke. Approximately 70 million American adults (33%) suffer from elevated blood pressure (BP),¹ but only 50% have their hypertension under control.²

Hypertension among African Americans is higher compared to Whites and has an early onset, greater severity, and is associated with more extensive organ damage. Higher rates of obesity, diabetes mellitus (DM), and physical inactivity combined with higher salt sensitivity and other cultural factors contribute to higher rates of hypertension among African Americans.³ Hypertension increases with age and it is higher among females aged >65 years (73.6% women vs 65.4% men, respectively).² Higher prevalence of both HTN and DM among African Americans contribute to their higher morbidity and mortality rates of stroke and heart failure.^{4–7}

Among those with hypertension, a sub-group is composed of those who fail to achieve goal blood pressure ($<140/90$ mm Hg or $<130/80$ mm Hg in

patients with DM or chronic kidney disease [CKD]^{8,9} with a combination of ≥ 3 classes of antihypertensive drugs, including a diuretic. This form of hypertension, resistant hypertension (rHTN), has been a matter of debate,^{10–12} and its prevalence is reported to vary from 25% to 38% of hypertensive patients.^{13–15} Resistant hypertension is reported to be higher among the elderly, men, and African Americans, due in part to co-morbidities, non-adherence to drug regimen, or inadequate treatment.^{16,17} In the African American community, problems such as obesity, DM and CKD are more prevalent and are associated with higher prevalence of HTN.^{16,17} Both high levels of HTN and rHTN are associated with higher risks of stroke, myocardial infarction (MI), congestive heart failure (CHF), and CKD.^{18–21} In addition, patients with rHTN have an increased prevalence of DM and target organ damage as well as carotid intima-media thickening, left ventricular hypertrophy, microalbuminuria, and retinal lesions compared to patients who have achieved BP goal.²²

Treatment of Hypertension

Several trials have pointed to usefulness of treating HTN with diuretics therapy, along with an angiotensin-converting enzyme (ACE) inhibitor, angiotensin receptor blocker (ARB), calcium channel blocker (CCB), or conventional beta-blocker (BB).²³ Successful management of high BP is always a multi-faceted effort aimed at improving the lives of patients.²⁴ Both

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Joint National Committee-7 (JNC-7) and International Society on Hypertension in Blacks (ISHIB)²³ have provided treatment guidelines, which indicate that the initial antihypertensive drug should be started at the lowest dose, and gradually increased depending upon the BP response and up to the maximum tolerated dose. It is common in elderly African American patients to use two or more drugs to achieve the BP goal. Initially, a diuretic should be one of the first of two agents when starting combination therapy. When available, a single-pill combination of the two agents may be used to increase adherence to medication in the elderly population.²⁵ Although the benefits of lowering blood pressure are evident, consideration must also be given to medication side effects, drug interactions, and other co-morbidities.²⁶

The appropriate selection of antihypertensive agents at the proper doses is a complex issue requiring greater understanding of the patient's comorbidities and available pharmacologic options. Each drug has its benefits and risks depending upon age and comorbidities. Usually, diuretics or other monotherapy drugs are ineffective in achieving BP goal in elderly patients. However, when diuretics are used in various combinations with ACEI/ARB, CCB and BB, BP goal is usually achievable. These drugs as a monotherapy are generally ineffective in lowering BP among the diabetic elderly. However, clinical trials have shown that combinations of two or more agents are more effective in controlling and attaining targeted BP goal.^{23,24}

Since ACE inhibitors or ARBs have some protective properties against end-organ damage, they should be used in combination with other anti-hypertensive agents to slow progression of organ damage in hypertensive patients. A recent study of African American hypertensive patients in New York reported that 64.8% of the patients were on ACEI/ARBs, 54.8% were on diuretics, 41.9% were on CCBs, and 33.8% were

Since one-third of California adults are affected by both hypertension and DM, we examined patterns of pharmacological treatment of the African American hypertensive, particularly those with DM/CKD.

on beta-blockers.¹³ Unfortunately it was not clear whether these agents were used as monotherapy or used in a multi-therapy mode to attain goal blood pressure.

Purpose of the Study

Since one-third of California adults are affected by both hypertension and DM, we examined patterns of pharmacological treatment of the African American hypertensive, particularly those with DM/CKD. A recent survey of residents living in South Los Angeles reported a high rate of hypertension, stroke, and congestive heart failure.²⁷ In another study conducted in South Los Angeles, the authors found that more than 79% of the aged African Americans were suffering from hypertension and more than 30% had DM.²⁸

This article adds to the previously reported findings by examining patterns of pharmacologic management of hypertension among the African American elderly with a focus on two issues: 1) Is the treatment of hypertension consistent with the treatment guidelines provided by JNC-8 and ISHIB?; and 2) Does the treatment vary for the hypertensive patients with DM or CKD?

METHODS

The analysis for our study was based on data collected for a 2-year cross-

sectional investigation designed to: 1) identify prescribing trends of medications and polypharmacy, and 2) explore feasibility of an intervention to reduce polypharmacy in African American seniors who suffer from various chronic conditions. This study surveyed 400 African Americans, aged ≥ 65 years, recruited from 16 predominantly African American churches located in South Los Angeles.

The study used face-to-face interviews that documented type, frequency, and dosage of all medications used by participants. Informed consent was obtained from all participants. Participants were asked to bring all of their medications (prescribed and over the counter) for documentation by the field staff. Medication use was ascertained through visual inspection of medication containers. Label information of each drug was recorded. The duplication of medications was documented at the time of the survey. Drug interactions were later evaluated by the study pharmacist and reported to the patient's clinician.

The survey focused on chronic medical conditions as diagnosed by a physician and the entire medication inventory for each identified clinical condition was obtained. For those participants who identified a physician-diagnosed hypertension (341 of 400 elderly; 85%), the names of all medications prescribed and taken were noted. The project field staff did not measure the participants' blood pressure or the level of blood glucose. Hence, findings presented here are based on self-reported data by 400 elderly, mean age 74 (SD ± 7), mostly females (65%), living alone (51%), not working (94%), and having more than six comorbidities. (30%)

RESULTS

Characteristic of Participants

This analysis included 341 hypertensive African American individuals who were aged 65–94 years (Table 1). More than 39% of participants were aged ≥ 75 years. One out of four

Table 1. Demographic characteristics and percentage of chronic diseases, %

Characteristic	Total ^a	Male ^b	Female ^b
Age			
65–74 years	60.5	61	60.2
75–84 years	31.5	31.9	31.3
≥85 years	8	7.1	8.5
Number of medications			
<5	25	35.5	19.3
5–7	28.8	30.5	27.8
8–10	26	20.6	29
>10	20.3	13.5	23.9
Educational Status			
<High school	24.8	31.9	20.8
High school	35.3	38.3	33.6
Some college or associates degree	28.8	19.1	34
Graduate/post graduate	11.3	10.6	11.6
Living status			
Live alone	50.8	45.4	53.7
Live with somebody	49.3	54.6	46.3
Job Status			
Full/part time	6.3	6.4	6.2
Not working	93.8	93.6	93.8
Marital status			
Married	17.5	24.1	13.9
Not married	82.5	75.9	86.1
Insurance			
Medicaid (Medi-Cal)	79	81.6	77.6
Medicare	31.5	39	27.4
Both Medicaid and Medicare	28.7	36.2	24.7
Comorbidities			
<4	31.5	36.9	28.8
4–6	38.3	31.9	42
>6	29.8	31.2	29.9
Hypertension	85.3	83	86.5
Resistant hypertension	21	21.3	20.8
Arthritis	63.1	46	72
Stroke	12.8	14.9	11.7
CKD	11.6	15.6	9.3
Gastro intestinal disease	21.6	19.1	23
Anxiety	16.8	14.2	18.3
Diabetes mellitus	36.9	33.3	38.9
Depression	13.1	18	13.2
Sleeping disorder	22.9	19.9	24.5
Severe low back pain	35.7	29.8	38.9
Dementia	4.5	5.7	3.9
Cancer	13.8	14.9	13.2
Doctor visits (mean)	6.71	6.43	6.86

^a The study sample of 400 elderly African Americans (aged >65 years, taking at least two medications) from 16 churches located in South Los Angeles.

^b Thirty-five percent (141) represents the male participation in the study sample and 65% (259) represents the female participation.

participants reported having no high school diploma. Almost 65% of participants were women. Of the hypertensive African Americans with >6 comorbidities, only 19.5% of the sample were

currently married. Over 79% and 31% of the sample reported being enrolled in Medicare and Medicaid (Medi-Cal), respectively. In addition, 28% of participants enrolled in both Medicaid and

Medicare. Furthermore, only 7% of the sample reported their present health as excellent, however, more than one-third described their health as fair (29.1%) or poor (4.5%). Three out of four reported visiting more than one type of physicians. About 8% of respondents did not have a regular or primary care provider (data not shown).

In all, the number of chronic illnesses reported by the sample ranged from 1 to 17 with the average number of conditions reported just over 5 (5.2 ± 3.01). These comorbidities had a wide variation in prevalence and they included HTN (85%), arthritis (63%), severe back problem (36%), DM (37%), anxiety/depression (30%), sleep/insomnia (23%), gastrointestinal disorders (22%), stroke (13%), and kidney diseases (12%) (Table 1). Further, more than one-quarter (28%) of the elderly were hospitalized and one-third obtained emergency room services during the year. On average, these elderly patients were taking 7.7 medications for various health problems (data not shown).

Pharmacologic Management of Hypertension

Since our focus was on hypertension, we examined prescription of anti-hypertensive agents within the parameters of JNC-7 and ISHIB guidelines for elderly patients.^{9,23} Given these guidelines, our study revealed several meaningful trends: 1) while 29% (98 of 341) were being treated with only one anti-hypertensive agent, 35% were on two agents, 22% were on three, and 9% were on all four classes of medications (ACEI/ARB+CCB+BB+ diuretics); 2) Among those taking only one agent (n=98), the most frequently used agents were ACEI/ARB (43%), CCB (27%), BB (12%), or diuretics (18%); 3) Among those taking two classes of anti-hypertension medications (n=120), most frequent combinations were ACEI/ARB+CCB (27%), ACEI/ARB + diuretics (22%), ACEI/ARB+BB

Table 2. Use of anti-hypertension drugs among hypertensive elderly

	All Hypertensive Patients, n=341		Hypertensive Patients with DM and/or CKD, n=162		Hypertensive Patients without DM and CKD, n=179	
	n	%	n	%	n	%
No medication total	18	5.3	3	1.9	15	8.4
One medication						
Total	98	28.7	42	25.9	56	31.3
A	42	42.8	23	54.8	19	33.9
B	12	12.2	4	9.5	8	14.3
C	26	26.5	11	26.2	15	26.8
D	18	18.4	4	9.5	14	25.0
Two medications						
Total	120	35.2	62	38.3	58	32.4
A+B	20	16.7	8	12.9	12	20.7
A+C	32	26.7	15	24.2	17	29.3
A+D	26	21.7	19	30.6	7	12.1
B+C	16	13.3	7	11.2	9	15.5
B+D	9	7.5	5	8.1	4	6.9
D+C	17	14.2	8	12.9	9	15.5
Three medications						
Total	75	22.0	37	22.8	38	21.2
A+B+C	21	28.0	12	32.4	9	23.7
A+B+D	29	38.7	14	37.8	15	39.5
A+C+D	13	17.3	5	13.5	8	21.1
B+C+D	12	16.0	6	16.2	6	15.8
Four medications total	30	8.8	18	11.1	12	6.7
A+B+C+D						
Other meds ^a	45	13.2	23	14.2	22	12.3

A, ACE inhibitors and angiotensin II receptor blocker; B, beta-blockers; C, calcium channel blockers; D, Diuretics; DM, diabetes mellitus; CKD, chronic kidney disease.
^a Other meds: clonidine, spironolactone, guanidine, prazosin and isosorbide.

(17%), and CCB + diuretics (14%); and 4) Among those with 3 agents (n=75), diuretics were combined with ACEI/ARB + BB + diuretics in 39% of patients, ACEI/ARB + CCB + diuretics 17%, BB + CCB + diuretics 16% and a combination therapy of ACEI/ARB+BB+CCB occurred in 28% of patients using three agents. There were some elderly (n=18, 5%) who did not take any medication even though they reported having hypertension (Table 2).

These data clearly indicate that treatment of hypertension with only one agent among nearly one-third of the elderly was inconsistent with the recommended guidelines and is considered sub-optimal therapy because of various comorbidities that are associated with hypertension in the elderly population. In this study, diuretics in a two-agent combination (ACEI/ARB + diuretics or

CCB + diuretics or BB + diuretics) were prescribed to only 43% of the elderly (52 of 120). However, diuretic use increased to 72% in a three-agent combination (ACEI/ARB + CCB + diuretics or ACEI/ARB + BB + diuretics or BB + CC + diuretics). Further, both diuretics and CCBs were prescribed to 9% patients (30 of 323 patients on medication) who took all four classes of medications (ACEI/ARB + CCB + BB + diuretics).

Management of Hypertension in Patients with DM/CKD

We examined variations in the treatment of hypertension when the hypertensives were diagnosed with either DM or CKD. We combined these two sub-groups as one group simply because the hypertension treatment also involves protecting the organs from

damage. In 341 hypertensive individuals, 47.5% (n=162) had either DM or CKD (Table 2). In this group (DM+CKD), 26% took one class of anti-hypertension medication (most common were ACEI/ARB or CCB), 38% took two classes (most common were ACEI/ARB + diuretics or ACEI/ARB+CCB), 23% took three classes of agents (most common combinations were ACEI/ARB+BB+CCB or ACEI/ARB + BB + Diuretics) and 11% took all four classes of anti-hypertensive medications.

Once again, as indicated by ISHIB guidelines, elderly patients with DM/CKD should be treated with combinations of two or more agents. Thus, it appears that the treatment of DM/CKD patients with only one-agent was inconsistent with ISHIB guidelines. Similar inconsistency has been reported by

Table 3. Combination medication anti-hypertension therapy among African-American taking at least three medications including diuretic

	All Cases, n=84		Cases with DM and/or CKD, n=43		Cases without DM and CKD, n=41	
	n	%	n	%	n	%
A+B+D	29	34.5	14	32.6	15	36.6
A+C+D	13	15.5	5	11.6	8	19.5
B+C+D	12	14.3	6	14.0	6	14.6
A+B+C+D	30	35.7	18	41.9	12	29.3
Other meds ^a	21	25	13	30.2	8	19.5

A, ACE inhibitors and angiotensin II receptor blocker; B, beta-blockers; C, calcium channel blockers; D, Diuretics; DM, diabetes mellitus; CKD, chronic kidney disease.
^a Other meds: clonidine, spironolactone, guanidine, prazosin and isosorbide.

Oparil.²⁹ The pattern of medication use was similar among patients without DM+CKD (n=179; Table 2) where 31% took only one class of medication (most common ACEI/ARB or CCB), 32% took two agents (most common ACEI/ARB + CCB); 21% took three different agents (most frequently ACEI/ARB + BB + diuretics or ACEI/ARB + BB + CCB) and 7% took all four classes of anti-hypertensive medications.

Management of Hypertension with at Least Three Medications (including a Diuretic)

Our analysis indicated that 26% of the elderly (84 of 323) were taking ≥3 anti-hypertensive medications including a diuretic, which most likely is an indicator of rHTN in our study population. The proportion of rHTN in our study is similar to the reported rate of rHTN in previous studies.¹³⁻¹⁵ Further, 60% of patients who were taking ≥3 anti-hypertension medications including a diuretic were non-adherent to medical regimen as they frequently forgot to take medication or did not refill prescriptions for various reasons including high cost. In addition, this sub-group (rHTN) had an average of 5.4 co-morbidities including arthritis (67%), DM (33%), back pain (33%), depression and anxiety (25%), sleep apnea (20%), kidney problems (16%), stroke (13%), and dementia (9%). No sex differences emerged for these clinical characteristics. This sub-group (rHTN) of seniors consumed more than nine

medications per day (including over-the-counter agents) and visited their physicians six times during the year. Nearly one-fifth (20%) of these elderly patients were on clonidine or spironolactone for renal protection. In addition, one-third (34%) used Emergency Room (ER) services (more females than males used ER; 39% vs. 26%, P<.001) and 28% were hospitalized in the past 12 months. Given these clinical characteristics, we first delineated patterns of medication use for elderly taking ≥3 medications including a diuretic, as a total group (n=84), and later examined differences between those with DM and CKD (n=43) and those without such comorbidities (n=41; see Table 3).

Table 3 shows two trends: 1) more than one-third (30 of 84 elders; 36%) were on all four classes of medication; and 2) the remaining 64% were taking three-agent combinations, which always included a diuretic with either ACEI/ARB + CCB + diuretic (16%), or ACEI/ARB + BB + diuretic (35%), or BB + CCB + diuretic (14%). Furthermore, for renal protection, clonidine or spironolactone was prescribed for one-fifth of the elders. However, some differences emerged in medication pattern when DM/CKD sub-group was compared with those without DM/CKD (Table 3). This comparison revealed that the proportion of elderly taking all four classes of medications was higher among those with DM+CKD compared to those without DM/CKD group (42% vs 29%, P<.001). While more females

than males were taking all four classes of medication (44% vs 20%, P<.02), more males than females were prescribed beta blockers in combination with ACEI/ARB + BB + diuretics (53% vs 24%, P<.007). This greater use of beta blockers (BB) among males suggests more cardiac problems among males compared to females.

DISCUSSION

Our study of African American elderly has provided interesting results. First, a large proportion (85%) of our African American seniors were diagnosed with hypertension, and, of these, 95% were taking anti-hypertension medications. Second, 66% of the elders were being treated with a combination of ≥2 drugs, which is consistent with the guidelines provided by both JNC-8 and ISHIB.⁹ However, treatment of nearly one-third of elderly patients (who may have been experiencing many comorbid-

...66% of the elderly were being treated with a combination of ≥2 drugs, which is consistent with the guidelines provided by both JNC-8 and ISHIB.⁹

ities for a number of years) with only one class of medication (monotherapy) may be sub-optimal and is inconsistent with the established guidelines for lowering blood pressure.²⁹

Third, we found that 26% of the elders, who were taking three or more anti-hypertension medications including a diuretic, appeared to be similar to those reported by other studies including the New York (NY) study of African American patients in treatment.¹³⁻¹⁵ Further, among the NY patients,¹⁴ the most prescribed antihypertensive agents were ACEI/ARB (65%), BB (34%), CCB (42%), and diuretics (55%). However, the pattern was different in our study when examining all those on a combination of two to four agents: ACEI/ARB (76%), BB (61%), CCB (62%), and diuretics (48%). In addition, the difference between these two studies appears to reflect the age difference in African American patients. The NY study¹⁴ had younger patients (mean age 57 years; 72% females) while our study population was much older (mean age 74; 65% females) who had greater number of cardiovascular problems which may account for a higher usage of BBs. Additionally, the use of prescribed medication was higher in our study when compared to the NY study (7.7 vs 2.9 respectively).

Some distinct differences have emerged in the patterns of treatment among those who are taking ≥ 3 anti-hypertension medications including a diuretic. Here, those who had DM/CKD compared to those without such diseases were more often treated with a combination of all four classes of anti-hypertensive agents. In fact, it is in this sub-group that we found a higher use of clonidine or spironolactone. This finding is consistent with the prevailing guidelines directing use of ≥ 2 drugs to protect against organ damage among those who also have DM. Among such patients, renal protection can be increased by focusing on reducing microalbuminuria.³⁰ Apparently, the use of

clonidine and spironolactone among 20% of patients on ≥ 3 medications (including a diuretic) who have DM/CKD, appears to be consistent with this treatment approach.^{27,30,31}

Limitations and Strengths

There are several limitations of our study; they do not compromise data validity or internal accuracy but limit the generalizability of our findings. First of all, the participants were not randomly selected; they volunteered for the study through their churches. Secondly, there are a higher proportion of female respondents that limits generalizability to elderly males. Thirdly, the study staff neither took actual blood pressure nor asked the seniors whether their BP was under control. Another limitation of this study is that in the instances where other anti-hypertensive medications not belonging to the four main categories (eg, alpha antagonists, like Prazosin, or alpha agonists, like Clonidine) were prescribed, the study survey instrument did not provide the indication for which the medication was prescribed. For example, in the case of terazosin, it was not apparent if the indication was benign prostate hypertrophy or HTN. Further, the study staff did not inquire about the length of treatment. Findings reported here are based on self-reported data except for prescriptions which were noted by the field staff. Despite these limitations, the findings of our study are useful with regard to: 1) filling a void of how elderly African Americans with HTN are being treated for their blood pressure problems; 2) how consistent is their treatment with the available guidelines; and 3) how frequently health services are being utilized by these hypertensive seniors.

CONCLUSION

A significant majority of African American seniors living in South Los Angeles suffers from hypertension and

treatment of hypertension in nearly one-third of cases is inconsistent with the guidelines provided by JNC-8 and ISHIB.⁹ Furthermore, one-fourth of the hypertensive elderly are on three or four different classes of anti-hypertension medications including a diuretic which could indicate resistant hypertension. These data suggest that future studies should be conducted to better assess the perceptions and attitudes of prescribers serving similarly underserved populations. Further, with the implementation of the Affordable Care Act (ACA), where physician extenders (eg, nurse practitioners, physician assistants) will assume greater responsibility in the care of underserved patients, the perceptions, attitudes, as well as knowledge of the providers should be assessed with respect to the established standards of care guidelines, JNC8 and ISHIB. The need for promotion of JNC 8 and ISHIB guidelines becomes even more critical in light of the increasing number of underserved patients due to ACA, and in some states expanded scope of practice, for pharmacists who are responsible for the providing the pharmaceutical component of care.

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