

# Patient-related barriers to hypertension control in a Nigerian population

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**Background:** Hypertension control is a challenge globally. Barriers to optimal control exist at the patient, physician, and health system levels. Patient-related barriers in our environment are not clear. The aim of this study was to identify patient-related barriers to control of hypertension among adults with hypertension in a semiurban community in South-East Nigeria.

**Methods:** This was a cross-sectional descriptive study of patients with a diagnosis of hypertension and on antihypertensive medication.

**Results:** A total of 252 participants were included in the survey, and comprised 143 males (56.7%) and 109 females (43.3%). The mean age of the participants was  $56.6 \pm 12.7$  years, with a diagnosis of hypertension for a mean duration of  $6.1 \pm 3.3$  years. Among these patients, 32.9% had controlled blood pressure, while 39.3% and 27.8%, respectively, had stage 1 and stage 2 hypertension according to the Seventh Report of the Joint National Committee on Prevention, Detection and Evaluation of High Blood Pressure. Only 23.4% knew the consequences of poor blood pressure control and 64% were expecting a cure from treatment even when the cause of hypertension was not known. Furthermore, 68.7% showed low adherence to medication, the reported reasons for which included forgetfulness (61.2%), financial constraints (56.6%), high pill burden (22.5%), side effects of medication (17.3%), and low measured blood pressure (12.1%). Finally, knowledge and practice of the lifestyle modifications necessary for blood pressure control was inadequate among the participants.

**Conclusion:** Poor knowledge regarding hypertension, unrealistic expectations of treatment, poor adherence with medication, unawareness of lifestyle modification, and failure to apply these were identified as patient-related barriers to blood pressure control in this study.

**Keywords:** Blood pressure, medication adherence, knowledge of hypertension, proteinuria, diabetes mellitus, lifestyle modification

## Introduction

Hypertension is the leading cause of cardiovascular disease worldwide,<sup>1,2</sup> and is the major cause of death and second leading cause of disability after childhood malnutrition globally.<sup>3</sup> Briganti et al reported that almost one third of Australian adults may have hypertension.<sup>4</sup> In sub-Saharan Africa, hypertension is the most rapidly increasing cardiovascular disease, affecting over 20 million people and being the most common cardiovascular cause of hospitalization and mortality.<sup>5</sup> Hypertension ranks first among the noncommunicable diseases in Nigeria,<sup>6</sup> with a prevalence ranging from 8% to 46.4% in men and women in rural and urban communities.<sup>7-12</sup>

Although improving the quality of care for hypertension is a priority, most hypertensive patients have inadequately controlled blood pressure,<sup>13,14</sup> leading to an increased risk of coronary artery disease, congestive heart failure, renal insufficiency, and stroke.<sup>13</sup>

In addition, knowledge of hypertension on the part of patients is low, and control of blood pressure is generally suboptimal in rural and urban communities.<sup>15–17</sup>

Hypertension is considered to be controlled when systolic blood pressure is less than 140 mmHg and diastolic blood pressure is less than 90 mmHg.<sup>18,19</sup> Population surveys have shown that hypertension is either untreated or inadequately controlled in about 70%–75% of people worldwide, despite advances in drug treatment that have made life more tolerable for hypertensives.<sup>20</sup> Barriers to blood pressure control appear to exist at the patient, physician, and system levels. Patient-related barriers include poor knowledge concerning hypertension and its consequences,<sup>21–23</sup> the side effects of antihypertensive drugs,<sup>23</sup> poor adherence with drug therapy (a major factor),<sup>24,25</sup> erroneous health beliefs,<sup>26,27</sup> inability to make lifestyle changes, unrealistic expectations of treatment (for example, expecting a cure),<sup>28</sup> and demographic factors (eg, socioeconomic status, educational level, age, sex).<sup>29</sup> Poor adherence with therapeutic guidelines,<sup>30</sup> inadequate understanding of therapeutic goals,<sup>21,31</sup> and failure to emphasize the lifestyle modifications necessary in the management of hypertension<sup>32,33</sup> are major physician-related barriers. Further, an inefficient health care system<sup>34</sup> and low socioeconomic status<sup>35</sup> may present a barrier to blood pressure control, given that the inaccessibility of hospitals and high costs of screening and treatment may hinder optimal control of hypertension in the low socioeconomic groups.<sup>36</sup>

Currently, safe and effective antihypertensive medications are readily available for most hypertensive patients.<sup>15</sup> Therefore, it is of paramount importance to identify barriers to obtaining optimal blood pressure control as they relate to patients. This is necessary to maximize the therapeutic effects of these drugs and to reduce the morbidity and mortality associated with hypertension. Most Nigerian studies on blood pressure control and related factors in hospital settings<sup>37,38</sup> and rural/semiurban communities<sup>17,39</sup> have not focused on patient-related barriers to hypertension control. A few have assessed the knowledge base of patients<sup>40</sup> and their adherence to medication,<sup>40–42</sup> but assessed the latter using nonvalidated tools developed by the researchers themselves for their own research purposes.

We therefore set out to identify patient-related barriers to hypertension control in a representative adult population of hypertensives in a semiurban area of South-East Nigeria. The findings of this study will add to the existing body of knowledge and help initiate concerted efforts towards curbing the rising prevalence of uncontrolled hypertension in our region.

## Materials and methods

### Study design and site

This was a descriptive cross-sectional questionnaire-based study carried out in Olokoro, a semiurban community in the Umuahia South local government area of Abia State, South-East Nigeria. The community is about 8 kilometers from Umuahia township, the state capital. The inhabitants are predominantly Christians and most are traders or artisans with a few civil servants and farmers.

### Study population

The study population included all adults with a previous diagnosis of hypertension made by medical personnel and on antihypertensive medication at the time of the study. They were identified during a medical screening exercise carried out in Olokoro, Umuahia South local government area of Abia State, South-East Nigeria, from August 15 to 18, 2013.

### Sample size and sampling

The proportion of patients adhering to their antihypertensive medication in a hospital-based study in Umuahia was 42.9%.<sup>42</sup> The sample size in this study was extrapolated from this value at a 95% confidence level with a 5% margin of error using appropriate formulae.<sup>43</sup> This gave a minimum sample size of 376. However, 390 patients were included to allow for attrition.

### Inclusion and exclusion criteria

Consenting adults aged 18 years or older with a previous diagnosis of hypertension made by medical personnel and on antihypertensive medication were included. Patients with a psychiatric illness, an appearance of being chronically ill, or known hypertensive emergency were excluded.

### Recruitment and data collection

The subjects were recruited consecutively. A structured, pretested researcher-administered questionnaire consisting of five sections was used for data collection. The first section canvassed baseline demographic characteristics, including age, sex, educational level, occupation, and duration since diagnosis of hypertension, and social characteristics, ie, alcohol consumption and smoking. The second section was designed to elicit the respondent's knowledge of hypertension and its causes, the consequences of poor blood pressure control, and expectations of treatment. The third section addressed the respondent's knowledge of the lifestyle measures necessary for blood pressure control and their practice of the same. The fourth section assessed adherence to antihypertensive

medication using a validated eight-item scale designed for use in an outpatient setting.<sup>44</sup> In a previous study, this scale was reported to have acceptable internal consistency (Cronbach's alpha 0.83), with items that maintained a high item-to-item correlation ( $>0.4$  for each) and scores that correlated with blood pressure control.<sup>44</sup> The fifth section documented the participant's blood pressure, weight, height, body mass index, urinalysis, and blood sugar. The face and content validity of the questionnaire was evaluated by a community physician, a cardiologist, and two resident doctors. The questionnaire, written in English, was translated into the local dialect by an expert in that dialect. The translated format was thereafter translated back to English by a second party. The two English versions were then cross-checked for accuracy and consistency in the questions. The interview was conducted in English and the local dialect using interpreters where necessary.

Blood pressure was measured in the nondominant arm using a mercury sphygmomanometer (Accoson, Health Care Equipment, Egham, UK) in the sitting position after resting for 3–5 minutes. Blood pressure was categorized according to the Seventh Report of the Joint National Committee on Prevention, Detection and Evaluation of High Blood Pressure (JNC-VII).<sup>19</sup> Height was measured using a stadiometer with the participant standing erect, barefoot and without a cap, with the occiput, back, buttock, and heel making contact with a vertical wall. Weight was recorded using a digital bathroom weighing scale.

The subjects were instructed on how to collect a mid-stream urine specimen. Menstruating females and those with febrile illness or clinical features suggestive of urinary tract infection were excluded from urinalysis. The participants thereafter provided urine samples that were tested using ten parameter urine strips (Chung-Do Pharmaceutical Co, Ltd, Gangwon-Do, Republic of Korea). Individuals with proteinuria of 1+ or greater were considered to have significant proteinuria. Those with nitrite-positive samples were excluded from subsequent analysis as they were presumed to have urinary tract infection. Blood sugar was analyzed using an Accu-Chek<sup>®</sup> glucose meter (Roche, Basel, Switzerland). The screening definition for diabetes was based on World Health Organization criteria,<sup>45</sup> which define random blood sugar of  $\geq 11.1$  mmol/L (200 mg/dL) as diabetes mellitus, or previous diagnosis of diabetes by a physician, or use of hypoglycemic agents.

## Data protection

Data were stored using the Microsoft Excel program, kept secure, and only released for analysis when needed.

Confidentiality was maintained and the anonymity of responses ensured. Personal identifiers were not collected. Permission was obtained from the local government authorities and informed consent from the participants. Anonymity of responses was ensured by nondisclosure of the identity of participants.

## Statistical analysis

The data obtained were analyzed using Statistical Package for the Social Sciences version 21.0 (IBM Corp, Armonk, NY, USA). Continuous variables were expressed as the mean and standard deviation, and categorical variables were expressed as frequencies and proportions. Appropriate diagrams and tables were used to illustrate results where necessary. The chi-square test was used to determine associations between variables. Logistic regression analysis was used to determine the factors associated with the practice of lifestyle modification in those aware of these measures. Statistical significance was assumed at  $P < 0.05$ .

## Results

Complete data was available for 252 participants (a response rate of 64%) and used in the analysis. The general characteristics of the patients are shown in Table 1. The mean age of the patients was  $56.6 \pm 12.7$  years, with more males ( $n=143$ , 56.7%) than females ( $n=109$ , 43.3%). The mean duration of diagnosis of hypertension was  $6.1 \pm 3.3$  years. At the time of the study, 39.3% of participants had stage 1 hypertension, 27.8% had stage 2 hypertension, and 32.9% had controlled blood pressure according to JNC-VII (Table 1). There was no relationship between the educational attainment of respondents and their blood pressure control ( $\chi^2$  with trend 0.53,  $P=0.47$ ).

Significant proteinuria was found in 12.3% of the respondents, and diabetes mellitus was found in 5.2%. Blood pressure control among respondents was not significantly associated with the presence of proteinuria ( $P=0.243$ ) or diabetes mellitus ( $P=0.772$ ).

A considerable number of respondents (65.1%) knew what hypertension meant and 55.6% knew at least two causes of hypertension. However, only 23.4% of respondents knew two or more complications of poor blood pressure control, and 64% were expecting a cure from treatment (Table 2).

A significant number of participants (68.7%) reported low adherence to antihypertensive medication (Figure 1). The reasons cited for low adherence are shown in Table 3. The Morisky Medication Adherence Scale-8 (MMAS-8) used, showed a Cronbach's alpha of 0.78 implying high internal consistency.

**Table 1** Characteristics of study participants

Parameter	Frequency (n=252)	Percent
Mean age $\pm$ SD (years)	56.6 $\pm$ 12.7	
Sex		
Male	143	56.7
Female	109	43.3
Marital status		
Single	24	9.5
Married	159	63.1
Divorced/separated/widowed	69	27.4
Occupation		
Trader/self-employed	112	44.4
Farmer	68	26.9
Civil servant	35	13.9
Pensioner	13	5.2
Student	8	3.2
Clergy	8	3.2
Unemployed	8	3.2
Educational status		
Primary	72	28.6
Secondary	105	41.6
Tertiary	44	17.5
No formal education	31	12.3
Blood pressure category (JNC-VII)		
Normal	15	6
Prehypertension	68	27
Stage 1	99	39.3
Stage 2	70	27.8
Mean duration of hypertension diagnosis $\pm$ SD (years)	6.1 $\pm$ 3.3	
Mean BMI $\pm$ SD (kg/m <sup>2</sup> )	27.3 $\pm$ 3.5	
Mean systolic BP $\pm$ SD (mmHg)	145 $\pm$ 18	
Mean diastolic BP $\pm$ SD (mmHg)	80 $\pm$ 12	

**Abbreviations:** SD, standard deviation; BP, blood pressure; BMI, body mass index; JNC-VII, Seventh Report of the Joint National Committee on Prevention, Detection and Evaluation of High Blood Pressure.

There was a disparity between the participants' knowledge of lifestyle modification in the management of hypertension and their practice of the relevant measures (Figure 2). Among those aware of salt restriction as a lifestyle modification, civil servants (adjusted odds ratio [OR] 0.12; 95% confidence interval [CI] 0.02–0.96) and those with a longer duration since diagnosis of hypertension (adjusted OR 0.78; 95%

**Table 2** Participants' basic knowledge of hypertension, causes, complications and treatment outcomes

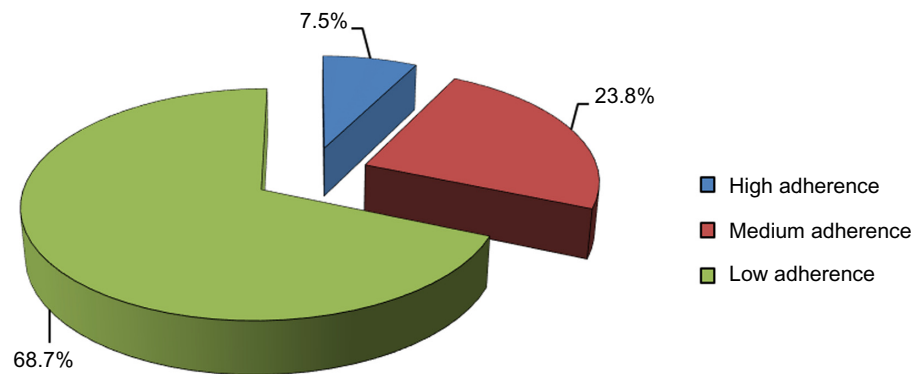
Parameter	Frequency	Percentage
Meaning of hypertension	164	65.1
Causes of hypertension ( $\geq$ 2)	140	55.6
Consequences of poor blood pressure control ( $\geq$ 2)	59	23.4
Expectations of treatment		
Cure	161	64.0
Control for life if cause is not known	98	36.0

CI 0.68–0.89) were less likely to practice salt restriction. Respondents who were currently married were more likely to practice salt restriction (adjusted OR 2.35; 95% CI 1.10–5.00).

None of the sociodemographic variables assessed were found to be associated with the likelihood of practice of regular exercise among respondents who were aware of this lifestyle modification. Those with only secondary level of formal education were less likely to attempt weight reduction, despite being aware of its importance in blood pressure control (adjusted OR 0.13; 95% CI 0.03–0.52).

## Discussion

Although adequate blood pressure control (<140/90 mmHg) is a major approach in reduction of the morbidity and mortality related to cardiovascular disease, achieving this target has remained a global challenge. Better control is needed, especially among Africans, because reports have shown that they have worse hypertension-related outcomes, including higher rates of fatal stroke, heart disease, and end-stage renal disease when compared with their white counterparts.<sup>46,47</sup> However, rates of adequate blood pressure control vary widely globally and in Nigeria. The low rate of blood pressure control (32.9%) obtained in this study is consistent with the 31% reported in Kano, Nigeria,<sup>38</sup> the 31.4% reported in Abeokuta, Nigeria,<sup>48</sup> and the 34% reported in the USA.<sup>19</sup> Further, it is lower than the 36% reported from Ibadan,<sup>41</sup> the 42.7% reported from Sokoto, Nigeria,<sup>37</sup> the 53.3% reported from Ilorin, Nigeria,<sup>49</sup> the 35% previously reported in Umuahia, Nigeria,<sup>42</sup> and the 39% reported in Cuba.<sup>50</sup> The majority of our study participants were traders, who tend to sit in one place to conduct their business (sedentary lifestyle) and may not undertake regular exercise. In addition, these traders spend most of their day at the market and depend on food vendors for most of their meals. Food from these sources is often salt-laden to improve taste. All these factors can adversely affect blood pressure control and contribute to low blood pressure control rates. However, the blood pressure control rate in this study was higher than the 12.4% reported in Zaria, Nigeria,<sup>40</sup> the 24.2% from Port Harcourt, Nigeria,<sup>51</sup> the 29.4% in Edo State, Nigeria,<sup>7</sup> and the 10% reported in some parts of Europe.<sup>52</sup> The mean duration since diagnosis of hypertension and hence the duration of drug treatment was higher in our study, and could account for the higher blood pressure control rate when some of these studies are compared. In general, these figures indicate that achieving optimal blood pressure control is still a challenge worldwide.



**Figure 1** Adherence pattern of participants.

Hypertension may exist in association with other comorbidities in which there are compelling indications for use of specific medications.<sup>19</sup> Some of these comorbidities including diabetes, chronic kidney disease, heart failure, and ischemic heart disease, can influence the outcome of blood pressure control.<sup>19</sup> Proteinuria is an early indicator of kidney damage.<sup>53</sup> In the setting of hypertension, it may be a marker of renal parenchymal disease as either a complication or cause of hypertension. It can also be an indicator of nephropathy in diabetics and pre-eclampsia in pregnant women.<sup>19</sup> Unlike other studies,<sup>54,55</sup> this study did not reveal a significant association between presence of proteinuria or diabetes mellitus and blood pressure control. This may be due to the smaller sample size of our study compared to these other studies.

Patient education can improve blood pressure control.<sup>56</sup> Before treatment is started, the hypertensive patient needs medical information on the meaning of hypertension, its causes, the duration of treatment, and the need for adherence to medication, lifestyle modification, and regular follow-up visits.<sup>57</sup> A well informed patient is more likely to accept treatment and comply with the physician's prescriptions, and be less likely to discontinue treatment prematurely.<sup>58</sup> Misunderstanding of prescriptions on the part of patients (in terms of duration of use and dosing

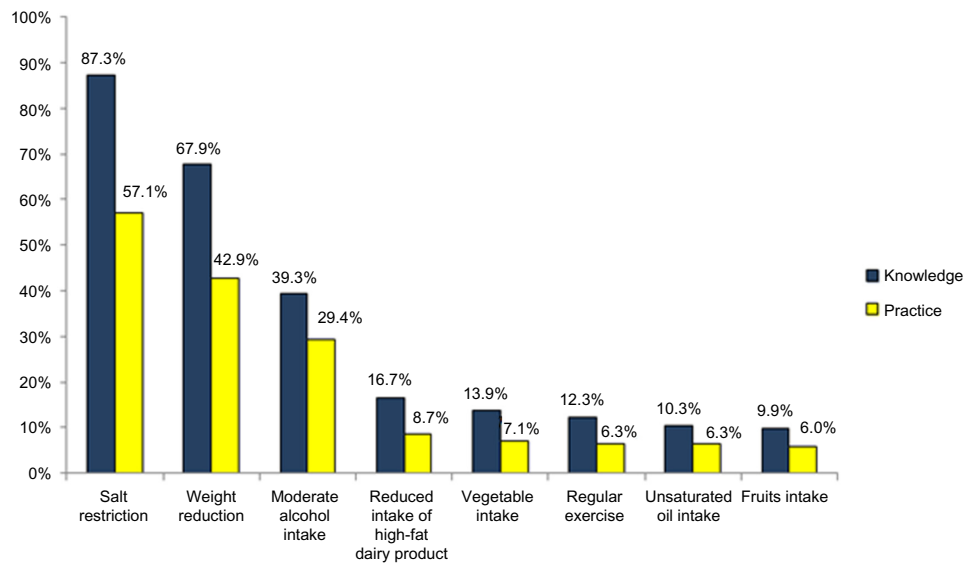
of drugs) and failure to get drug refill was reported in a study by Okeahialam.<sup>59</sup> Even though a good proportion of participants (more than 50%) seemed to have a fair understanding of hypertension and its causes (Table 2), most did not understand the complications of poor blood pressure control. In addition, a sizeable number were ignorant of the duration and expectations of treatment for hypertension. These misconceptions and knowledge gaps have been reported to be particularly critical for Africans, who may have different perceptions of hypertension and different expectations of care.<sup>60</sup> Patients whose beliefs are discordant with traditional biomedical concepts of hypertension have poorer blood pressure control than those whose beliefs are concordant.<sup>60</sup> Beliefs that hypertension is "curable" and not chronic, and that medication is needed only for hypertension-related symptoms may translate into poorer rates of medication adherence and blood pressure control.

Adherence is defined by the World Health Organization as the extent to which a person's behavior, ie, taking medication, following a diet, and/or implementing lifestyle changes, corresponds with the recommendations made by a health care provider.<sup>61</sup> Adherence requires the patient's active participation in a therapeutic alliance established between the patient and physician.<sup>62</sup> There are several methods available for measurement of adherence,<sup>62</sup> none of which can be considered a gold standard. The use of standardized validated questionnaires and patient self-reporting is simple, inexpensive, and regarded as the most useful method in the clinical and outpatient settings.<sup>62</sup> However, these measures are susceptible to error with increased time between visits and their results are easily distorted by patients. The low level of adherence to antihypertensive medication by the majority of participants in this study corroborates previous reports that adherence is poor in some patients with hypertension.<sup>38,41,42,63</sup> Factors identified in this study as being responsible for low adherence

**Table 3** Reason for low level of adherence among participants

Reason	Frequency (n=173)	Percentage
Forgetfulness	106	61.2
Lack of funds	98	56.6
Feeling of well-being and cure	34	19.6
Advice from spiritualists	1	0.6
Herbal remedies	3	1.73
Side effects of medication	30	17.3
Measured blood pressure was low	21	12.1
High pill burden	39	22.5





**Figure 2** Knowledge and practice of lifestyle modification in management of hypertension among respondents.

are shown in Table 3. Suffice it to say that forgetting to take antihypertensive medication is not a problem that adult patients overcome. This has been attributed to competing psychosocial demands in everyday life,<sup>42,64</sup> especially among traders. Physicians' awareness of this is crucial for optimal care of adult hypertensive patients in Nigeria.

A financial impediment to drug purchase was noted in 56.6% of participants. This raises the issue of the role of the patient's socioeconomic status in blood pressure control, as discussed in other studies.<sup>17,40,42</sup> Nigeria's health expenditure is ranked among the lowest in the world,<sup>65</sup> and about 70% of Nigerians live below the poverty line.<sup>66</sup> Newer and more potent antihypertensive drugs are available, but are largely unaffordable for the majority of patients. The nature of essential hypertension as a lifelong disease, the need for daily medication, and the cost and side effects of drugs all need to be taken into consideration in the design of an effective therapeutic regimen for hypertensive individuals.

The effectiveness of self-monitoring of blood pressure in improving blood pressure control is also well documented.<sup>67,68</sup> Mengden et al found average blood pressure reductions of 19.3/11.9 mmHg at 6 months in a home monitoring group versus 10.6/8.8 mmHg in a usual care group.<sup>69</sup> Some participants in our study showed evidence of home blood pressure monitoring that was quite commendable. However, 12.1% discontinued their medications when they found that their blood pressure was lower than earlier measurements. This habit is incompatible with good practice and should be discouraged.

The JNC-VII<sup>19</sup> and the Nigerian Hypertension Society guideline for the management of hypertension<sup>70</sup> recommend lifestyle modification for all patients with hypertension or prehypertension. These modifications, previously referred to as nonpharmacologic therapy, serve as adjunctive therapy for hypertension and include weight reduction, increased physical activity, moderation of dietary sodium and alcohol intake, and following the Dietary Approach to Stop Hypertension eating plan. The effectiveness of these lifestyle measures in preventing and treating hypertension is well established.<sup>71,72</sup> Knowledge about lifestyle modification in our study was generally poor, and the knowledge-practice discordance noted is particularly alarming. This result is consistent with other similar reports of poor knowledge and application of lifestyle measures for blood pressure control among patients with hypertension.<sup>40,41,73</sup>

## Conclusion

Poor blood pressure control in the majority of participants was an important finding in this study. Although this could be largely multifactorial, identified patient-related barriers include inadequate knowledge of the consequences of poor blood pressure control, unrealistic expectations of treatment, poor adherence to medications (forgetfulness and financial constraints being mainly responsible for this), poor knowledge of lifestyle measures, and a knowledge-practice gap in application of lifestyle measures.

## Recommendations

Achieving control of hypertension requires a team effort. Although both physician and patient factors need to be addressed to improve hypertension control, emphasis should be placed on interdisciplinary team-based care utilizing health care providers such as nurses, physician assistants, and pharmacists. Team-based care has been shown to have the greatest impact of all the strategies available for improving blood pressure control.<sup>74</sup>

In addition, patient education, addressing misconceptions about hypertension, regular home blood pressure monitoring, the need for consistency in drug and nondrug measures prescribed as well as regular follow-up need to be addressed at each clinic visit. Physicians should prescribe drugs which are pocket-friendly and have a low side effect profile. Up to 17.3% of our participants who were not adherent to drugs attributed this to the side effects of medications. Premature discontinuation of treatment due to drug side effects and lack of money to buy drugs interrupt consistent use of antihypertensive medication.<sup>40,75</sup>

Physician and health system barriers also contribute to poor blood pressure control, but these were not the focus of this study. However, they also need to be identified and corrected for any meaningful control of blood pressure to be achieved. They also represent an area for further research as few relevant data exist in the literature. These measures, if taken into consideration, will help to stem the rising tide of the hypertension pandemic and its complications in our region.

## Limitations

Blood pressure control should ideally be assessed using the average of two or more consecutive blood pressure readings taken on different occasions. However, this study was carried out as part of a screening exercise in which we did not have the benefit of knowing participants' previous blood pressure readings and there was no subsequent follow-up of the participants. Medication adherence was assessed using the Morisky's questionnaire which has not been validated for use in this population.<sup>44</sup> Further studies are needed in our population to validate the use of this tool. The assessment of the practice of lifestyle modification among participants in this study was limited by the use of subjective responses alone. This was due to a paucity of validated tools to objectively assess this vital aspect of patient management.

## Disclosure

The authors report no conflicts of interest in this work.

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