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ORIGINAL RESEARCH

Knowledge of Hypertension and Compliance with Therapy Among Hypertensive Patients in the Bamenda Health District of Cameroon: A Cross-sectional Study

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ABSTRACT

Introduction: The prevalence of hypertension has continued to increase and is now a great burden for health care providers. Obtaining information on the factors affecting compliance to antihypertensive drugs is thus important. The aim of this study was to assess knowledge of hypertension and to determine factors affecting the compliance of hypertensive patients to their antihypertensive drugs.

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Methods: This was a cross-sectional study involving 221 hypertensive patients in the Bamenda Health District. Validated questionnaires were used. From December 2014 to March 2015, knowledge of hypertension was assessed using a 15-item scale, while compliance was assessed using the 8-item Morisky Medication Adherence Scale. Statistical analysis was performed using SPSS version 20.

Results: 14.0%, 53.4%, and 32.6% of participants had adequate, average, and poor knowledge of hypertension, respectively. The antihypertensive compliance rate was 43.9%. Independent predictors of noncompliance were forgetfulness (OR = 0.011, 95% CI = 0.002–0.063), lack of motivation due to the incurable nature of the disease (OR = 0.068, 95% CI = 0.017–0.274), and lack of symptoms of the disease (OR = 0.019, 95% CI = 0.02–0.23). There was a significant association between compliance and blood pressure control ($p < 0.001$).

Conclusion: Knowledge of hypertension was poor. Compliance rate to treatment was low. Some medication-related, patient attitude, and health care provider factors affected

compliance. Knowledge positively affected compliance, and good compliance was associated with good blood pressure control. Emphasis should be placed on patient education and reminders to patients to take their drugs.

Keywords: Antihypertensive drugs; Compliance; Hypertension; Knowledge

INTRODUCTION

Hypertension is a chronic disease characterized by elevation of blood pressure. Medication compliance refers to the act of conforming to the recommendations made by the provider with respect to the timing, dosage, and frequency of medication taking. It is measured over a period of time [1].

In 2008, 40% of adults worldwide aged 25 and above had been diagnosed with hypertension, and the number of people living with hypertension stood at 1 billion [2]. Hypertension is a major health problem in Cameroon. In 2003, in a study of a population of 10,011, the prevalence was reported as 24.6% [3]: 25.6% in males and 23.1% in females. Previously considered a disease of the developed world, hypertension is occurring with increasing frequency in developing countries. This increasing prevalence of hypertension has been attributed to increased urbanization and westernization of lifestyles, with a higher prevalence found in the urban as opposed to rural areas [4]. In addition, the prevalence of hypertension is expected to continue to increase globally [5]. The number of adults with hypertension in 2025 is predicted to increase by about 60%, to a total of 1.56 billion.

The prevalence of hypertension is also increasing in Cameroon, as seen from a study assessing changes in blood pressure values over a 10-year period between 1994 and 2003 [6]. The study revealed an increase in mean blood pressures in rural women (SBP +18.2 mmHg, DBP +11.9 mmHg) and men (SBP +18.8 mmHg, DBP +11.6 mmHg). In the urban areas, SBP increased in women (+8.1 mmHg, $p < 0.001$) and men (+6.5 mmHg, $p < 0.001$), while DBP increased only in women (+3.3 mmHg, $p < 0.001$). There was also a significant (two- to fivefold) increase in the prevalence of hypertension (crude and age-adjusted) in rural and urban men and women over the ten-year period. All of these data indicate that hypertension is currently a big challenge to health workers and will continue to be for some time to come.

Blood pressure control involves the implementation of a number of lifestyle modifications as well as the use of one or more antihypertensive drugs [7]. Lifestyle modifications include (amongst others) adjustment of the diet, cessation of smoking, reduction of alcohol intake, weight reduction or control, increase in physical exercise, and stress management. Although lifestyle modifications are important, patients may also require one or more antihypertensive drug(s) to achieve effective blood pressure control. These drugs will have to be taken by the patient throughout his/her life [7].

The most common complications of hypertension include stroke (cerebrovascular accident), ischemic heart disease, retinopathy, nephropathy, and peripheral vascular disease [8], which can be prevented or delayed by effective blood pressure control. In a study in Douala (2014), hypertension was found to be the most common risk factor for stroke in patients in Cameroon, with 81.2% of stroke victims found to have a positive history of hypertension [9].

While educating patients is the responsibility of qualified health personnel, compliance to therapy depends on the individual patient. A study carried out in Buea (Cameroon) in 2014 revealed that only 33.3% of hypertensive patients were complying with their antihypertensive drug therapy [10]. In a resource-poor setting in Nigeria, only 32.1% of the hypertensive patients showed good compliance [11], whereas in a resource-poor setting in Pakistan, it was 48.3% [12]. A study performed in 2012 in Cameroon revealed that only 59.9% of known hypertensive patients were taking antihypertensive drugs, despite being aware of their condition [13]. The reasons for this poor compliance need to be better understood if they are to be modified.

We undertook this study to assess patient knowledge of hypertension in hypertensive patients as well as to determine factors affecting the compliance of these patients with their medication, as this information could help to guide the development of interventions to improve drug adherence facilitating optimization of blood pressure control among patients with hypertension in Cameroon.

METHODS

Study design and setting

This was an observational cross-sectional study carried out in the Bamenda Health District of the North West Region of Cameroon over a period of four months (December 2014 to March 2015). This health district has a population of about 336,372 persons according to the 2012 national census. It is one of the 19 health districts of the North West Region and comprises 17 health areas: Nkwen Baptist, Nkwen Urban, Mbatchangwa, Atuakom, Ntambag, Ntamulung, Mulang, Azire, Alakuma, Bamendakwe, Ndza, Akumlam, Alabukam, Mankon, Alamandum, Nkwen Rural, and Ntankah.

Study Participants and Data Collection

The sample population comprised hypertensive patients who were aged at least 21 years at diagnosis, were on antihypertensive medications for at least 6 months, and resided in communities in the various health areas in the Bamenda Health District of Cameroon. We excluded hypertensive patients who were not on pharmacologic treatment.

Sensitization of the patients was achieved by making announcements in community group meetings and churches. This made them aware of the study beforehand so as to reduce resistance and hostility towards the interviewer.

A convenient sampling method was used. Health areas in this study were chosen based on ease of access and familiarity to the interviewer.

The minimum sample size was calculated using the formula $s = z^2[p(1-p)]/d$, where s = minimum sample size, z = standard normal variate, p = an estimate of the proportion of the patients in the study who complied with their antihypertensive drug regimens, d = sample error to be tolerated, and the confidence interval = 5%. Therefore $d = 0.05$, confidence level = 95%. This implies z–score = 1.96. Predicted proportion of the patients who complied with their antihypertensive drug regimens (p) = 13% (this was the compliance in a similar study in Bangladesh [14]).

A minimum sample size of 174 patients was required, but 221 hypertensive patients were ultimately recruited. Hypertensive patients in various health areas in the Bamenda Health District were then approached so as to include them in the study.

Structured and validated questionnaires were administered orally by the investigator to persons who consented. The questionnaires were used to obtain information on the sociodemographic status of the participants, to assess knowledge of hypertension, to assess compliance with antihypertensive therapy, and to determine the factors affecting compliance.

Blood pressure was measured twice on the same arm after the participant had rested for 5 min, and the average of both values was considered the blood pressure of the participant.

After data collection, participants were educated on the basics of hypertension and its management, and the correct answers to the section on knowledge were given to the participants. Emphasis was placed on the importance of good antihypertensive drug compliance. Any questions the participants had on hypertension and health in general were answered.

DATA MANAGEMENT AND STATISTICAL ANALYSIS

The data were collected as stated above and entered into Microsoft Excel 2013. SPSS version 20 was used to analyze the data.

Knowledge of hypertension was assessed on a scale of 15, based on answers to 15 questions, as shown below (Table 1). The scale was adapted from one used in a similar study in Pakistan to assess knowledge of hypertension [15]. A score of less than 8 represented poor knowledge, a score of 9–12 represented average knowledge, and a score of 13–15 represented adequate knowledge.

To assess the association between knowledge and compliance, participants were grouped into those who had adequate knowledge and those who had inadequate knowledge. Compliance with antihypertensive medication was measured using the 8-item Morisky

Medication Adherence Scale. Compliance was measured on a scale of 8 based on answers to 8 questions. A score of less than 3 represented compliance and a score of 3–8 represented noncompliance.

Blood pressure control was assessed as recommended by Joint National Committee JNC 8 [16], based on the blood pressure reading obtained. Blood pressure <140/90 mmHg represented good blood pressure control in patients less than 60 years old, blood pressure ≥140/90 mmHg represented poor blood pressure control in patients less than 60 years old, blood pressure <150/90 mmHg represented good blood pressure control in patients aged 60 years and above, and blood pressure ≥150/90 mmHg represented poor pressure control in patients 60 years and above.

Other questions in the questionnaire were used to collect information on sociodemographic factors, medication-related factors, complications, and health care provider factors.

All variables were categorized. Chi-square and Fisher's exact tests were used as tests of statistical significance to examine the relationships between variables. Variables were divided into sociodemographic, medication-related, and health care provider-related factors, and analyzed with compliance as the dependent variable. This was used to determine how these factors affected patient compliance. Multivariate analysis of factors which had a statistically significant association with compliance was done by logistic regression to identify independent predictors of noncompliance. Statistical significance was established at $p < 0.05$.

Compliance with Ethics Guidelines

All procedures followed were in accordance with the ethical standards of the responsible

Table 1 Knowledge of hypertension questionnaire

	Question	Yes	No	Don't know
1	Do you know the value above which blood pressure is described as high?			
2	Elevated blood pressure is called hypertension			
3	A patient always has symptoms like headache, dizziness and fatigue each time his/her blood pressure is high			
4	Both men and women have equal chances of developing hypertension			
5	Hypertension is a curable condition			
6	The older the person is, the greater their chances of having hypertension			
7	Smoking increases the chances of developing hypertension			
8	Eating fatty foods increases the chances of developing hypertension			
9	Being overweight increases the chances of developing hypertension			
10	Regular physical activity reduces a person's chances of developing hypertension			
11	Eating more salt has no effect on blood pressure			
12	Dietary approaches to reduce hypertension do no good			
13	Red meat is good for control of hypertension			
14	Medication alone can control hypertension			
15	Hypertension can lead to other life-threatening diseases			

committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1964, as revised in 2013. They were also in accordance with the ethical standards of the Institutional Review Board of the Faculty of Health Sciences, University of Buea, Cameroon.

Informed consent was obtained from all participants before they were included in the study.

RESULTS

Sociodemographic Characteristics of the Population

Of the persons approached during data collection, 221 met the inclusion criteria for the study. Of the 221 participants, 98 (44.3%) were male. Ages of participants ranged from 37 to 86 years, with a mean age of 62.86 ± 11.4 years. 147 (66.5%) reported that they were married, and 96 (43.3%) were retired. 65 (29.4%) had received secondary education, as opposed to 64 (29%) who had received no formal education (Table 2).

Knowledge of Hypertension

Of the 221 participants in this study, 31 (14.1%) had adequate knowledge of hypertension. 118 (53.4%) had average knowledge, while 72 (32.6%) had poor knowledge of hypertension. The factors which positively affected knowledge of hypertension significantly were male sex, age less than 63 years, and higher level of education (Table 3).

Compliance with Antihypertensive Medications

Of the 221 participants in this study, 97 (43.9%) persons were found to be compliant with their antihypertensive drug treatments, while 124 (56.1%) persons were found to be noncompliant. Some medication-related factors, patient factors, and health care

Table 2 Sociodemographic characteristics of the population ($N = 221$)

Variable	Frequency ($N = 221$)	Percentage (%)
Sex		
Males	98	44.3
Females	123	55.7
Age (years)		
<40	2	0.9
40–49	22	10.0
50–59	64	29.0
60–69	63	28.5
≥70	70	31.7
Marital status		
Married	147	66.5
Widowed	66	29.9
Single	8	3.6
Educational status		
No formal education	64	29.0
Primary	40	18.1
Secondary	65	29.4
Tertiary	52	23.5
Occupational status		
Employed	87	39.4
Unemployed	38	17.2
Retired	96	43.4

provider-related factors were found to have statistically significant associations with compliance. These are shown in Table 4. The independent predictors of noncompliance following logistic regression were forgetfulness, lack of motivation due to the incurable nature of the disease, and failure to keep clinic appointments (Table 5).

Compliance and Knowledge of Hypertension

Of the 31 participants who had adequate knowledge of hypertension, 23 (74.2%) were compliant while 8 (25.8%) were noncompliant. Of the 190 participants who did not have adequate knowledge of hypertension, 74 (38.9%) were compliant while 116 (61.1%) were noncompliant. This association between compliance and knowledge on hypertension was statistically significant ($p < 0.001$).

Blood Pressure Control

The systolic blood pressure (SBP) of the participants in this study ranged from 103 to 223 mmHg, with a mean of 154.29 ± 26.8 mmHg. The DBP of the participants ranged from 57 to 160 mmHg, with a mean of 90.07 ± 15.98.

Ninety-three participants (42.1%) had good BP control, while 128 (57.9%) had poor BP control. The factors associated with good BP control are shown in Table 6.

DISCUSSION

We found that 31 participants (14.0%) had a knowledge of hypertension which could be considered adequate. 118 participants (53.4%) had average knowledge and 72 (32.6%) had poor knowledge of hypertension. This was

Table 3 Factors affecting knowledge of hypertension

Variables	Frequency (percentage)			P value
	Poor	Average	Adequate	
Gender				
Male	24 (24.5%)	58 (59.2%)	16 (16.3%)	**0.036***
Female	48 (39.0%)	60 (48.8%)	15 (12.2%)	
Age (years)				
<63	12 (11.0%)	78 (71.6%)	19 (17.4%)	**<0.001***
≥63	60 (53.6%)	40 (35.7%)	12 (10.7%)	
Educational status				
No formal education	52 (81.2%)	12 (18.8%)	0 (0.0%)	**<0.001***
Primary	10(25.0%)	30 (75.0%)	0 (0.0%)	
Secondary	8 (12.3%)	48 (73.8%)	9 (13.9%)	
Tertiary	2 (3.9%)	28 (53.8%)	22 (42.3%)	
Clinic attendance				
Keep clinic appointments	36 (30.3%)	60 (50.4%)	23 (19.3%)	0.063
Do not keep clinic appointments	36 (30.3%)	58 (56.9%)	8 (7.8%)	

* Statistically significant

similar to knowledge levels observed in Quetta, Pakistan, in which 37.9% of participants had poor knowledge, 61.3% had average knowledge, and only 0.8% had adequate knowledge of hypertension [15]. In Ido-Ekiti, Nigeria, less than half of participants (47.1%) had good knowledge of hypertension [11]. These were however lower than values obtained in North Carolina, where 78% of participants had a good knowledge of hypertension [17].

The compliance rate among participants in our study was 43.9%, indicating that slightly less than half of the participants were compliant with their antihypertensive medications. This rate is similar to those observed in studies in Shiraz, Iran (39.6%) [18], Malaysia (44.2%) [19], Maringa, Brazil (46%) [20], and Abbottabad, Pakistan (48.3%) [12]. These countries with similar compliance rates are all developing countries. Health care systems are not the best in these countries, and when coupled with patient factors or the patients' attitude towards health, adherence rates are likely to be low. The compliance rate seen in the present work was lower than the corresponding rates observed in Ethiopia (64.6%) [21] and Idikan (51%) [22]. It was also lower than the range of rates, 50–70%, obtained by WHO from a review of various studies in different countries [23]. The compliance rate in our study was higher than the 33.3% compliance rate obtained in Buea [10] and the 32.1% compliance rate obtained in Ido-Ekiti [11].

Females were slightly more compliant than males. This difference was not statistically significant. A similar result was noted in studies in Maiduguri [24] and the DR Congo [25], in which no statistically significant

Table 4 Factors affecting good compliance with antihypertensive medications

Variables	Frequency (compliant participants)	Percentage (compliant participants)	Odds ratio (95% CI)	*P* value
Sociodemographic factors				
Gender				
Male	38	38.8	0.808 (0.593–1.102)	0.171
Female	59	48.0		
Age (years)				
Less than 63	45	41.3	0.889 (0.659–1.200)	0.441
63 and above	52	46.4		
Marital status				
Married	61	41.5	0.853 (0.630–1.155)	0.312
Widowed/single	36	48.6		
Educational status				
No formal education	28	43.8	0.995 (0.716–1.384)	0.067
At least primary	69	43.9		
Employment status				
Employed	37	42.5	0.950 (0.698–1.293)	0.742
Unemployed/retired	60	44.8		
Medication-related factors				
Number of drugs				
One drug	35	41.2	0.903 (0.660–1.236)	0.520
More than one	62	45.6		
Belief in drug efficacy				
Yes	95	47.7	0.190 (0.050–0.720)	**0.001***
No	2	9.1		
Cost of medications				
Affordable	69	59.0	2.190 (1.542–3.111)	**<0.001***
Expensive	28	26.9		
Drug availability				
Readily available	97	46.4	–	**0.002***
Not readily available	0	0.0		
Side effects				

Table 4 continued

Variables	Frequency (compliant participants)	Percentage (compliant participants)	Odds ratio (95% CI)	P value
Yes	6	21.4	2.200 (1.066–4.542)	**0.010***
No	91	47.2		
Patient factors				
Regular clinic attendance				
Yes	81	68.1	0.230 (0.145–0.367)	**<0.001***
No	16	15.7		
Forgetfulness				
Never forget	79	90.8	6.760 (4.375–10.444)	**<0.001***
Sometimes forget	18	13.4		
Use of traditional medicine				
Yes	8	13.8	3.959 (2.049–7.647)	**<0.001***
No	89	54.6		
Lack of motivation due to incurable nature of disease				
Yes	14	13.2	5.465 (3.311–9.019)	**<0.001***
No	83	72.2		
Stop medications when feeling well				
Yes	4	5.4	11.704 (4.477–30.6)	**<0.001***
No	93	63.3		

* Statistically significant

association between gender and compliance was observed. However, in Dar es Salaam, there was a statistically significant difference, with females found to be more compliant than males [26]. Contrarily, in Taiwan, males were significantly more compliant than females [27].

There was no significant association between age and compliance. This was similar to results of studies done in Ethiopia [21] and Lusaka [28], where there was also no significant association. This was, however, contrary to findings in the DR Congo [25] and Shiraz, Iran [18], in which there was a statistically significant association,

with older participants being more compliant than younger ones.

We found no significant association between compliance and marital status. Similar results were obtained in Dar es Salaam [26] and Shiraz, Iran [18]. This result was, however, contrary to findings in Maiduguri [24], in which married participants were found to be significantly more compliant than single participants.

Educational status had no significant association with compliance. This was similar to findings in Dar es Salaam [26] and Maiduguri [24].

Table 5 Independent predictors of good compliance to antihypertensive medication

Factor	Adjusted odds ratio	95% Confidence interval	p value
Knowledge of hypertension	0.694	0.113–4.252	0.693
Medication-related factors			
Belief in drug efficacy	5.497	0.240–126.045	0.286
Medication cost	0.745	0.174–3.187	0.692
Drug availability	–	–	0.998
Side effects	0.321	0.039–2.632	0.290
Patient attitude/factors			
Forgetfulness	0.011	0.002–0.063	**<0.001***
Clinic attendance	2.842	0.611–13.216	0.183
Traditional medicine	1.376	0.185–10.226	0.755
Lack of motivation due to incurable nature of disease	0.068	0.017–0.274	**<0.001***
Asymptomatic nature of disease	0.019	0.02–0.231	**0.020***
Health care provider factor			
Condition explanation	3.221	0.574–18.089	0.184

* Statistically significant

There was no significant association between compliance and occupational status. Participants in active employment were not more or less compliant than those who were not. This was similar to findings in Taiwan [27] and DR Congo [25].

There was no significant association between the number of antihypertensive drugs the participant was taking and compliance with treatment. This was similar to findings in Taiwan [27]. A controlled trial done on hypertensive patients in Japan also supported this [29]. This was contrary to findings in Buea [10], where participants on a single drug were significantly more compliant than those on multiple drugs. The reverse was true in Maiduguri [24] and Lusaka [28], where participants on more than one drug were significantly more compliant.

Participants who believed in the efficacy of the drugs they were taking were more compliant than those who did not believe in the efficacy of the drugs. This difference was statistically significant. This was in accordance with findings in Shiraz, Iran [18].

Participants who found the drugs to be affordable were more compliant than those who found the drugs expensive. This difference was statistically significant. This was similar to findings in Maiduguri [24], the DR Congo [25], and India [30].

The participants who reported that their drugs were not readily available were significantly less compliant. This was similar to findings in Ido-Ekiti [11] and Kuwait [31]. Patients who could not get the drugs they had been prescribed were less likely to be compliant because, even if they had the will, they did not

Table 6 Factors associated with good blood pressure control

Variables	Frequency	Percentage	Odds ratio (95% CI)	P value
Gender				
Male	34	34.7	0.723 (0.521–1.004)	**0.047***
Female	59	48.0		
Age (years)				
Less than 63	37	33.9	0.679 (0.493–0.936)	**0.016***
63 and above	56	50.0		
Alcohol consumption				
Yes	44	31.9	1.852 (1.368–2.506)	**<0.001***
No	49	59.0		
Smoking				
Yes	0	0.0	–	**0.014***
No	93	43.7		
Compliance				
Compliant	71	73.2	4.126 (2.772–6.140)	**<0.001***
Noncompliant	22	17.7		

* Statistically significant

have the drugs, preventing them from taking their medications as prescribed.

Participants who reported side effects of their drugs were significantly less compliant than those who had never experienced any side effects. This was similar to findings in Lusaka [28] and Idikan [22]. People who experience unwanted effects after taking a drug are more likely to stop taking the drug, resulting in poor compliance.

Some participants never forgot to take their medications. Others sometimes forgot and were less compliant. This difference was statistically significant. Similar findings were obtained in Idikan [22] and Kuwait [31].

There was a statistically significant difference in compliance between participants who regularly kept clinic appointments and those who did not keep appointments. Those who

kept clinic appointments were more compliant. This was similar to findings in Lusaka [28] and Mahe in the Seychelles [32].

There was a statistically significant difference in compliance between participants who used traditional medicine to treat their hypertension and those who did not. Those who did not use traditional medicine were more compliant. Similar findings were obtained in Ido-Ekiti [11] and Dar es Salaam [26]. People who tend to use traditional medicine generally believe that the traditional treatment is just as, if not more, effective than the medical treatment. There is therefore competition between the two treatment options, leading to reduced compliance with medical treatment.

Participants who reported a lack of motivation to take their drugs due to the incurable nature of hypertension were less

compliant than those who had no motivational problems. This association was statistically significant. This was similar to findings in Idikan [22] and Dar es Salaam [26].

Participants who stopped taking their drugs because they felt better or had no symptoms were less compliant than those who did not stop. This association was statistically significant. This is similar to findings in Maiduguri [24] and India [30]. Hypertension usually does not present with any symptoms. Therefore patients who rely on symptoms to take their medications are likely to be noncompliant, as they will certainly skip several doses of treatment when they feel well. The gravity of this is also seen in another study done in Nigeria, where as many as 58.3% of the participants believed that antihypertensive drugs should only be used when there are symptoms [33].

There was no significant association between compliance and complications. Participants who had experienced at least one complication of hypertension were not more or less likely to be compliant than those who had never experienced a complication. This is similar to what was obtained in Buea [10]. Our findings were contrary to findings in the DR Congo [25] and Shiraz, Iran [18], where patients who had experienced at least one complication were more likely to be compliant than those who had never experienced any complication.

Among the participants who regularly kept clinic appointments, there was no statistically significant association between compliance and confidence in the attending health care personnel.

Participants who were satisfied with how much health care personnel told them about hypertension were more compliant than those who felt they were not told enough about the disease. This relationship was statistically

significant. This is similar to what was observed in Lusaka [28]. Patients who are satisfied with what they are told with respect to management will feel more involved in the management process and will be more likely to play their role, which is compliance with the treatment.

There was a statistically significant association between knowledge of hypertension and compliance with treatment. Participants who had adequate knowledge of hypertension were more compliant than those who did not. This was similar to findings in Ido-Ekiti [11] and India [30]. Patients who have more knowledge of hypertension as a whole will have better understanding of the disease. They will therefore better understand important aspects of the disease such as its asymptomatic nature and the need for long-term treatment. They are therefore more likely to be compliant. This was, however, contrary to what was found in Quetta, Pakistan (Quetta, Pakistan), where there was an inverse relationship between knowledge and compliance [15].

42.1% of participants had controlled BP. This was similar to the BP control rate of 36.6% obtained in Ethiopia. This was higher than the BP control rates of 21.3% obtained in Buea [10] and 29.4% obtained in the DR Congo [25]. It was also higher than the BP control rate of 24.5% obtained from a study involving several major cities in Cameroon [13]. This is probably because in those studies with lower BP control rates, good BP control was considered to be BP < 140/90 mmHg. In our study, this was the cutoff point only for participants less than 60 years old. In participants aged 60 years and older, BP control was considered good if BP was less than 150/90 mmHg. This is in accordance with the most recent recommendations by JNC [16]. The higher BP control rates can also be explained by the fact that our compliance rate

of 43.9% was higher than the compliance rates of 33.3% and 21.2% obtained in Buea and the DR Congo, respectively [10, 25]. All of those were in line with a systematic review of several studies done across Africa, which concluded that the general rate of BP control is low throughout the continent [34].

There was a statistically significant association between compliance and BP control. Patients who were compliant were more likely to have good BP control than those who were noncompliant. This was similar to findings in Buea [10], Kuwait [31], Mahe in the Seychelles [32], and India [30]. The aim of taking medications is to achieve a target BP so as to have good BP control. Good compliance with treatment will therefore lead to good BP control.

Limitations

Our study had a small sample size of 221 participants. A larger sample size was difficult to realize due to the fact that we carried out a community-based study and had the difficult task of moving around in communities actively searching for hypertensive patients on antihypertensive medications. We also used a self-report method to assess compliance to treatment, which is an indirect method. While a self-report method was the most feasible method to use in our setting, it is not as accurate as direct methods of assessing compliance.

CONCLUSION

The knowledge of hypertension among hypertensive patients in Bamenda Health District was poor. Less than half of the patients suffering from hypertension knew enough about the disease, with only 14% of participants having adequate knowledge.

The level of compliance with antihypertensive drugs was poor, with only 43.9% of participants showing good compliance. There were several reasons for poor compliance in the Bamenda Health District: medication-related factors, patient attitude/factors, and a health care provider factor. No sociodemographic factor significantly affected compliance with treatment. The independent predictors of noncompliance following logistic regression were forgetfulness, lack of motivation due to the incurable nature of the disease, and asymptomatic nature of the disease.

Knowledge of hypertension positively affected compliance with antihypertensive medications. Participants who knew more about the disease were more compliant.

BP control was poor, with less than half of the participants (42.1%) having good BP control. Compliance with treatment positively affected BP control, as participants who were compliant with treatment were more likely to have good BP control.

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Compliance with ethics guidelines. All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1964, as revised in 2013. They were also in accordance with the ethical standards of the Institutional Review Board of the Faculty of Health Sciences, University of Buea, Cameroon. Informed consent was obtained from all participants before they were included in the study.

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