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Research Article

Influence of Depression on Antihypertensive Medication Adherence and Blood Pressure Control in Two Reference Hospitals in Cameroon: A Cross-Sectional Study

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Abstract

Hypertension is a major public health problem worldwide, and particularly in developing countries where it encompasses high rates of morbidity and mortality. Uncontrolled hypertension explains these rates of morbidity and mortality and may be more frequent in case of depression. This study aimed to assess the influence of depression on antihypertensive medication adherence and blood pressure control in Cameroon. We conducted a cross-sectional study in two reference hospitals in Cameroon from November 2023 to August 2024. We included hypertensive patients of 21 years or more treated with medications for at least 3 months. Depression was diagnosed with the Patient Health Questionnaire 9. Medication adherence was assessed using the Girerd questionnaire and blood pressure control through a 24 hours ambulatory blood pressure monitoring. We used the χ2 test to measure the association between categorical variables and the Spearman coefficient for correlation between quantitative variables. P values < 0.05 were considered as statistically significant. We included 70 patients (51.4% of women) with a median age of 57 years [49 – 65]. The median duration of hypertension was 60 months [24 – 120]. We found respectively 35.7%, 47.1%, 14.3% and 2.9% of monotherapy, dual, triple and quadruple combination therapy. There were respectively 60% and 20% of uncontrolled hypertension and poor medication adherence. Depression was present in 27.1% of participants. It was significantly associated to poor medication adherence [OR = 8.28, 95% CI (2.28 – 30.06); p = 0.001], but not to uncontrolled hypertension [OR = 1.64, 95% CI (0.54 – 5.01); p = 0.380]. Depression is frequent in hypertensive patients seen in the outpatient units of the Yaoundé and Garoua General Hospitals. It increases the risk of poor medication adherence with a tendency to uncontrolled hypertension.

Keywords

Depression, Medication Adherence, Blood Pressure Control, Cameroon

1. Introduction

Hypertension (HTN) is defined as a systolic blood pressure (SBP) ≥ 140 mmHg and/or a diastolic blood pressure (DBP) ≥ 90 mmHg during repeated office blood pressure measurements [1]. HTN is a major cardiovascular risk factor and public health problem. It is responsible of approximately 10 million deaths yearly worldwide [2]. The prevalence of HTN has doubled in the world since the 90s and nowadays affect 1.28 billion adults aged 30 to 79 years [3]. The prevalence is the highest in Africa where Akpa et al found 42% in 2020 [4]. In Cameroon, Kuate Defo et al found a prevalence of 32% in 2019 [5].

The challenges of management of HTN are related to unawareness as well as low rates of treatment and control. On average 50%, 40% and 20% of patients are respectively aware, treated and controlled [3]. These percentages are lowest in Sub-Saharan Africa were only 10% of patients have their BP controlled [3]. Many factors are associated to uncontrolled HTN such as overweight, non-compliance with lifestyle measures and poor medication adherence [6, 7]. Depression is another risk factor of uncontrolled HTN which is often overlooked. It is characterized by a depressed mood, psychomotor symptoms, conative disorders, cognitive disorders, vegetative signs of various importance and sometimes is associated to anxiety and suicidal thoughts [8]. The estimated prevalence of depression in the population is 7.2% [9]. It is increased 3 to 5 folds in hypertensive patients [10, 11]. Depression may interfere with BP control. In a sample of 1900 hypertensive patients in China, Wang et al found that depression increased 2 folds the risk of uncontrolled HTN [12]. In a meta-analysis of 27 randomized clinical trials, Wang et al found that concomitant management of HTN and depression significantly reduced BP with an average of 11 mmHg for SBP and 8 mmHg for DBP [13].

As mentioned above, one adult out of three is hypertensive in Cameroon and only 10% are controlled [5]. HTN is therefore frequently responsible of complications and high morbidity and mortality rates. In contrary to other determiners of uncontrolled HTN, depression is rarely assessed in Africa where most mental health issues are overlooked [14]. However, depression is not rare in Africa. In a systematic review, Endomba et al found that 33% of hypertensive patients in Africa had depressive symptoms [11]. But the influence of depression on BP control have never been assessed in our country. The demonstration of this interaction in our setting may lead to changes in practices and better management of patients in order to reduce the burden of hypertension.

2. Materials and Methods

2.1. Study Design and Setting

This was a cross-sectional study conducted in the outpatient units of the Yaoundé and Garoua general hospitals. These hospitals represent the highest level of reference in the health system of Cameroon.

2.2. Study Duration

We conducted this study during 10 months, from November 2023 to August 2024.

2.3. Participants and Sampling

We included patients aged 21 years or more with a confirmed diagnosis of HTN and prescribed antihypertensive medications for at least 3 months. Pregnant women, patients with secondary hypertension and with invalid ABPM results were excluded. We used a convenience sampling method.

2.4. Procedure

We obtained an ethical clearance N°0981/UY1/FMSB/VDRC/DAASR/SCD from the ethics committee of the Faculty of Medicine and Biomedical Sciences of the University of Yaoundé I. We also obtained research authorizations N°946-23/HGY/DG/DPM/APM-TR and N°24--0002/AR/MSP/HGG/DG respectively from the Yaoundé and Garoua General Hospitals. Participants were recruited among patients attending the outpatient units. After the informed consent was taken, we collected sociodemographic characteristics, data on HTN duration and treatment, physical activity and alcohol consumption using a predesigned questionnaire.

2.4.1. Assessment of Antihypertensive Medication Adherence

We assessed medication adherence using the Girerd questionnaire [15]. It is a 6-item scale with each item graded 0 to 1. It was developed and validated in a hypertension clinic, and its effectiveness confirmed in a large study [15-17]. Poor medication adherence was considered for a score of 3 or more.

2.4.2. Assessment of Physical Activity and Alcohol Consumption

Physical inactivity was defined as the practice of less than 150 minutes of moderate intensity physical activity and regular alcohol consumption for at least three drinks per week.

2.4.3. Measurement of Office and ABPM

Office blood pressure was measured using SPENGLER® "Autotensio" automated blood pressure machines with adapted upper arm cuffs, in the sitting position, after at least five minutes of rest and 30 minutes from exercising or drinking of coffee/thee. The BP was measured in both arms and averaged. We performed 24-hour ambulatory blood

pressure monitoring (ABPM) using GIMA® ABPM 35110 and CONTEC® ABPM50 machines with adapted cuffs. BP control was assessed using 24-hour ABPM. Uncontrolled hypertension was determined when the mean 24-hour SBP was ≥ 130 mmHg and/or mean 24-hour DBP ≥ 80 mmHg.

2.4.4. Screening of Depression

Depression was screened using the patient health questionnaire 9 (PHQ-9). PHQ-9 scores of 5, 10, 15, and 20 represented respectively mild, moderate, moderately severe, and severe depression [18].

2.5. Statistical Analysis

Data were analysed using Statistical Package for Social Sciences (SPSS) version 20.0. Results were presented in tables and figures. We used the Chi-square test to measure association between categorical variables. The spearman coefficient was used to test for correlation between quantitative variables. P-values < 0.05 were considered as statistically significant.

3. Results

We included 70 patients (51.4% women) in this study. The median age was 57 years [49 – 65] and nearly half of the participants had more than 60 years. Table 1 shows the baseline characteristics of the study participants. They were originating from all the three ethnic groups of Cameroon and most of them were married. The median duration of hypertension was 60 months [24 – 120]. Patients were treated with monotherapy, double, triple and quadruple combination therapy in respectively 35.7%, 47.1%, 14.3% and 2.9% of cases. The office BP measurements showed 38.6%, 18.6% and 5.7% of grade I, grade II and grade III HTN respectively. Two thirds of the participants had physical inactivity and 10% had regular alcohol consumption. The most frequent comorbidities were diabetes, obesity and dyslipidemia. Forty-two (60.0%) patients had uncontrolled HTN. The percentage of poor medication adherence was 20.0%.

Table 1. Baseline clinical characteristics of the study population.

Variables	Categories	Count	Percentages (%)
Gender	Male	34	48.6
	Female	36	514
Age (years)	< 50	20	28.6
	[50 – 60[	18	25.7
	≥ 60	32	45.7
Marital status	Single	6	8.6

Variables	Categories	Count	Percentages (%)
	Married	56	80.0
	Divorced	2	2.9
	Widower	6	8.6
Ethnic group	Bantou	17	24.3
	Semi-bantous	21	30.0
	Sudanese	32	45.7
HBP duration (months)	< 12	9	12.9
	[12 – 60[	23	32.9
	≥ 60	38	54.3
Office BP	Optimal	4	5.7
	Normal	6	8.6
	High normal	16	22.9
	Grade 1 hypertension	27	38.6
	Grade 2 hypertension	13	18.6
	Grade 3 hypertension	4	5.7
HBP treatment	Monotherapy	25	35.7
	Dual combination	33	47.1
	Triple combination	10	14.3
	Quadruple combination	2	2.9
Physical inactivity	Yes	44	62.9
	No	26	37.1
Alcohol consumption	Yes	7	10.0
	No	63	90.0
Comorbidities	Diabetes	34	48.6
	Dyslipidemia	17	24.3
	Obesity	20	28.6
	Tobacco smoking	1	1.4
	Gout	7	10.0
	Heart failure	6	8.6
	Stroke	9	12.9
	Chronic kidney disease	1	1.4
	HIV/AIDS	1	1.4
	Chronic viral hepatitis	2	2.9

The prevalence of depression was 27.1% with respectively 15.7%, 8.6% and 2.9% of mild, moderate and moderately severe depression (Figure 1). No patient had severe depression.
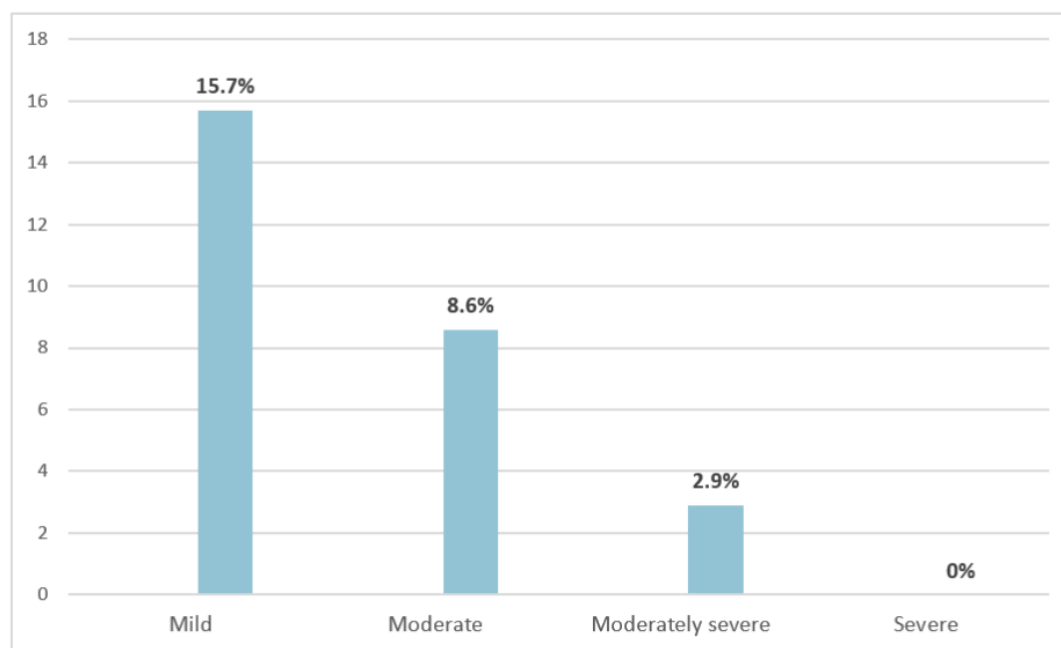
Figure 1. Prevalence and severity of depression according to screening results using the patient health questionnaire 9.

In the Table 2 we presented the results of office and ambulatory blood pressure monitoring in depressed and non-depressed participants. The median office and ambulatory blood pressures were higher in depressed participants but the differences were not statistically significant. The highest differences were observed for Nighttime blood pressures. There was a significant association of depression with poor medication adherence [OR = 8.28, 95% CI (2.28 – 30.06); p = 0,001] but not with uncontrolled HTN [OR = 1.64, 95% CI (0.54 – 5.01); p = 0.380]. There was a significant positive correlation between the PHQ-9 score and the GIRERD score but not with mean 24-hour systolic and diastolic blood pressures (Table 3).

Table 2. Results of office and ambulatory blood pressure monitoring in depressed and non-depressed participants.

	Depressed (n = 19)	Non-depressed (n = 51)	p
	Median (interquartile interval)		
Office BP (mmHg)			
Systolic	144 (133 – 167)	140 (133 – 156)	0.357
Diastolic	88 (79 – 101)	86 (78 – 91)	0.168
ABPM (mmHg)			
24h SBP	134 (122 – 149)	128 (119 – 139)	0.139
24h DBP	81 (72 – 97)	80 (71 – 84)	0.234
Daytime SBP	134 (122 – 151)	128 (120 – 140)	0.169
Daytime DBP	83 (72 – 99)	80 (73 – 86)	0.328
Nighttime SBP	131 (124 – 146)	123 (117 – 138)	0.071
Nighttime DBP	77 (69 – 88)	72 (66 – 82)	0.076

BP: blood pressure; ABPM: ambulatory blood pressure monitoring; SBP: systolic blood pressure; DBP: diastolic blood pressure

Table 3. Correlation between GIRERD score, 24-hour ABPM and PHQ-9 score.

Variables	Spearman coefficient	*p*
GIRERD score	0.57	< 0.001
24-hour SBP	0.10	0.399
24-hour DBP	0.11	0.346

SBP: systolic blood pressure; DBP: diastolic blood pressure

4. Discussion

This was to our knowledge the first study to assess the influence of depression on BP control in Cameroon. The gender distribution of our study population was close to the distribution of hypertensive people in urban areas in Cameroon reported by Kingue et al [19]. The participants of our study were older and more than half of them had a HTN duration of more than 5 years compared to the study of Kingue et al where HTN was diagnosed for the first time in more than 80% of the participants [19]. We had a percentage of HTN control of 40.0%, very close to the 37% and 43% found by Zhou et al in respectively women and men in high-income countries [3]. However, all the participants of our study had prescribed antihypertensive medications while only two-third of the patients in high income countries were treated in the study of Zhou et al [3]. Moreover, it was 4-fold higher than the percentage of BP control in Cameroon reported in the meta-analysis of Kuate Defo et al [5]. This difference can be explained by the very low rate of HTN treatment of 15,1% in the above meta-analysis. HTN was undertreated in our study participants with reference to the 2023 guidelines of the European Society of Hypertension which recommend dual combination treatment in most patients [1]. Indeed, more than one third of the participants were only on monotherapy.

Depression was strongly associated to poor antihypertensive medication in our study. However, this relationship is controversial in the literature. There are many screening tools for depression and using different of these tools may lead to different findings which may sometime be contradictory. When comparing our study with others in which the PHQ-9 questionnaire was used, we find concordant results. We can cite here the study of Liu et al including 9186 participants of the 2005 – 2018 National Health And Nutrition Examination Survey (NHANES) database and the study of Abdisa et al including 415 patients in Ethiopia [20, 21]. In contrary, Kretchy et al in Ghana used the DASS (Depression Anxiety Stress Scale) and found a very low prevalence of depression of 4% and no association with poor medication adherence [22]. In order to clarify this association, Stamoulis et al conducted a systematic review in 2024 including 18 studies [23]. Different tools were used for screening of depression in those studies. They found that half of the studies showed a signifi-

cant association between depression and antihypertensive medication adherence while the other half did not. It is therefore necessary to standardize screening tools for depression in epidemiological studies for them to be comparable.

We did not find a significant association between depression and uncontrolled HTN and many reasons may explain this result. The first is our low sample size which was probably insufficient to show a significant association. The second reason is the relatively high proportion of HTN undertreatment leading to high percentage of uncontrolled HTN in depressive patients as well as non-depressive patients. The third reason is that the PHQ-9 questionnaire may not be the best tool to show this association. Indeed, Fang et al used the PHQ-9 questionnaire in more than 28000 participants of the 2007 to 2018 NHANES database and found than the presence of depressive symptoms increased the prevalence of HTN as well as its treatment rate, but was not associated to BP control [24]. In contrary, Rubio-Guera et al showed a significant correlation between BP and depression using the Zung Self-rating Depression Scale with only 40 participants [25]. Similarly, Wang et al using the Hospital Anxiety and Depression Scale in 1856 patients found that depression was significantly associated with uncontrolled HTN [12].

This study sheds light on the burden of depression and mental disorders in large and their influence on cardiovascular health. Its strength was the usage of ambulatory blood pressure monitoring for the confirmation of uncontrolled hypertension. Limitations were the cross-sectional design, the small sample and the lack of drug concentration measurements. These limitations were all consequences of financial constraints.

5. Conclusions

Our study aimed to assess the effect of depression on antihypertensive medication adherence, and blood pressure control in Cameroon, where the burden of uncontrolled HTN is high. We found that depression is frequent in hypertensive patients seen in the outpatient units of the Yaoundé and Garoua General Hospitals. It was significantly associated with poor medication adherence, with an 8-fold increased risk. There was also a tendency to increased risk of uncontrolled HTN but without statistical significance. We recommend a systematic screening and management of depression in all hypertensive patients in outpatient clinics in Cameroon. Furthermore, it is necessary to conduct longitudinal studies on greater samples in order to better understand the relation between depression, antihypertensive medication adherence, and BP control in Cameroon.

Abbreviations

ABPM	Ambulatory Blood Pressure Monitoring
BP	Blood Pressure
CI	Confidence Interval

DASS	Depression Anxiety Stress Scale
DBP	Diastolic Blood Pressure
HTN	Hypertension
NHANES	National Health and Nutrition Examination Survey
OR	Odds Ratio
PHQ-9	Patient Health Questionnaire 9
SBP	Systolic Blood Pressure
SPSS	Statistical Package for Social Sciences

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Author Contributions

Ba Hamadou: Conceptualization, Methodology, Validation, Writing – review & editing

Dieudonné Danwe: Conceptualization, Methodology, Resources, Project administration, Investigation, Software, Data curation, Formal Analysis, Writing – original draft

Samuel Ntone-Enyime: Conceptualization, Methodology, Investigation

Dewa Koulsoumi Oummoul: Investigation

Alain Patrick Menanga: Conceptualization, Supervision, Validation

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Data Availability Statement

The data is available from the corresponding author upon reasonable request.

Conflicts of Interest

The authors declare no conflicts of interest.

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