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Research Article

Factors Associated with Poor Blood Pressure Control in Hypertensive Patients followed up in the Cardiology Outpatient Consultation Unit of Yalgado Ouedraogo Teaching Hospital (CHU-YO)

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Abstract

Introduction/Objective: Identify the factors associated with poor blood pressure control in hypertensive patients followed up in the cardiology outpatient consultation unit of CHU-YO.

Methodology: This was a two-month cross-sectional study with a descriptive and analytical focus.

Results: A total of 288 hypertensive patients were included in the study. 137 cases had poor blood pressure control, representing 47.57% of the total. In terms of sociodemographic characteristics, females dominated at 67.4% with a sex ratio of 0.48, and the average age was 60.2 ± 13.9 years. Cardiovascular risk factors were dominated by dyslipidemia, which accounted for 53.5%. The average of cases with a previous history of hypertension was 7.1 ± 5.1 years. In terms of treatment, fixed dual therapy was predominant with a rate of 57.3%. In multivariate analysis, urban residence, the presence of acute complications, and poor treatment adherence were associated with poor blood pressure control.

Conclusion: This study highlights the key factors contributing to poor blood pressure in hypertensive patients, such as life in urban settings, complications such as strokes, and poor treatment adherence, emphasizing the importance of holistic management.

Introduction/Problem statement

Arterial hypertension, known as the most common chronic disease, is a significant public health issue in developing countries. In sub-Saharan Africa, 10 and 15% of the adult population [1] are estimated to be affected, with a higher prevalence in urban areas [2], a rate which increases with age [3]. Hypertension is the main risk factor for cardiovascular diseases, strokes, kidney failures, and premature deaths [4,5]. In March 2023, based on the World Health Organization's data (WHO), an estimated number of 1.28 billion people worldwide aged 30 to 79 were believed to have hypertension [6]. In Africa, the prevalence of hypertension varies from one country to another and even from one study to the other in the same country. In Burkina Faso, hypertension has been increasing over the years, with an estimated prevalence of 18.6% [7]. Hypertension is responsible for approximately 9.4 million deaths worldwide each year, representing about

17% of all deaths [8]. This high morbidity and mortality rate is dependent on blood pressure balance.

However, keeping this balance stable remains a challenge for some countries, particularly the developing ones. Data from fifteen studies involving 139,907 participants in the United Arab Emirates over the past 25 years have indicated a higher hypertension prevalence (31%) with a control rate of 38% [9]. Another prospective study estimated that the number of uncontrolled hypertensive patients would go from 978 million in 2010 to 1.156 billion in 2025, an increase of 18% [10]. A study conducted in Burkina Faso in 2012 reported a rate of 54.2% of uncontrolled subjects [11]. Several factors may explain this situation, such as the lack of access to care, high medication costs, poor adherence to treatment, lack of follow-up, and inadequate preventive measures [12]. Reducing hypertension morbidity and mortality requires good blood pressure control, which necessarily implies a better understanding of the factors associated with poor blood pressure control, hence the importance of this study.

Materials and methods

This was a two-month (02) descriptive and analytical cross-sectional study conducted from January 4, 2024, to March 5, 2024. The survey was conducted in the cardiology outpatient consultation unit of Yalgado OUEDRAOGO Teaching Hospital (CHU-YO). The study included patients with known hypertension followed up (and receiving antihypertensive treatment) in the cardiology outpatient consultation unit of CHU-YO.

The diagnosis of a follow-up hypertensive patient was retained for patients whose diagnosis of high blood pressure was confirmed by a doctor and who were receiving antihypertensive treatment (for at least three months) with at least one consultation every three months in the cardiology department.

Poor blood pressure control is defined as systolic blood pressure (SBP) ≥140 mmHg and/or diastolic blood pressure (DBP) ≥90 mmHg (corresponding to a subject classified as having grade 1 or more hypertension according to ESH 2023 Guidelines for the management of arterial hypertension) in a follow-up hypertensive patient, measured in a health center. Poor treatment adherence is defined by the MORISKY score (MMAS 8) < 8. Left ventricular hypertrophy is defined based on echocardiographic criteria: interventricular septum thickness greater than or equal to 11mm and posterior wall thickness greater than or equal to 11 mm. Chronic renal failure is defined by a decrease in glomerular filtration rate below 60 ml/min/1.73m2 observed over a period of more than 3 months. Hypertensive retinopathy was suggested by fundoscopy and classified according to Kirkendall's classification.

Sampling was simple random and included follow-up patients in the cardiology outpatient consultation unit of the CHU-YO.

Analysis and data processing

Data were collected through a questionnaire administered to the patient during an interview and while consulting the health record. The data collected were recorded on an individual data collection form. Information was recorded and studied through Epi Info software version 7.2.5.0. We used the 2016 versions of Microsoft Excel and Word for text processing and for presenting the results in the form of figures and tables. In univariate analysis, Chi-square and Fisher's exact tests were used to identify categorical variables associated with ineffective blood pressure control. The significance threshold for the association between independent variables and blood pressure control was set at a p-value in a univariate analysis below 0.05, in order to determine the variables associated with poor blood pressure control.

Results

Socio-demographic data: During the study period, data were collected on 288 patients. The prevalence of uncontrolled hypertension was estimated at 47.57%. The proportion of women was 67.4% (*n* = 194) against 32.6% of men (*n* = 94), giving a sex ratio of 0.48. The average age of patients was 60.16 ± 13.9 years, with extremes of 22 to 89 years. The age range 60-70 accounted for 30.56% of cases. The proportion of patients living in urban areas was 87.8% (*n* = 253) against 12.2% (*n* = 35) of those in rural areas. Patients with a monthly income below 100,000 CFA francs accounted for 67.7% of cases (*n* = 195). Those with no health insurance accounted for 98.96% of cases. Table 1 shows the distribution of sociodemographic data for the study population.

Clinical Data and progression of hypertension: Among cardiovascular risk factors, the proportion of patients with dyslipidemia reached 53.47% (*n* = 154). Hypertension history had been pre-existent for an average of 85.4 ± 61.8 months (7.11 ± 5.15 years), with extremes from 3 to 360 months. The proportion of patients with acute complications at the time of our study was 49.65% (*n* = 143); those with stroke were 69.9% (*n* = 100). Table 2 shows the distribution of clinical data and hypertension progression.

Table 1: Distribution of socio-demographic data of the study population.

Variables	Number	Percentage (%)
Women	194	67.4
Men	94	32.6
Age range 60 to 70 years	88	30.56
Urban setting	253	87.8
Educational level		
Uneducated	128	44.4
Higher level	25	8.7
Monthly income in CFA F		
<100,000	195	67.71
≥100,000 and ≤300,000	80	27.78
>300,000	13	4.51
Socio-economic level		
Low	149	52.08
Medium	120	41.67
High	19	6.25

Table 2: Distribution of clinical data and hypertension progression in the study population.

Variables	Number	Percentage (%)
Cardiovascular risk factors		
Dyslipidemia	154	53.47
Diabetes	66	22.9
Obesity	69	23.9
Sleep apnea	69	23.95
Hypertension history		
<5 years	129	44.79
[5-10[	61	21.18
≥15 years	98	34.03
Hypertension complications		
Stroke	100	34.72
Hypertensive crises	58	20.13
MI	10	3.47

Treatment-related data

The molecRules were used in combined dual therapy (57.29%) in most patients. The proportion of patients taking more than one antihypertensive drug per day was 67.46%. The average treatment duration was 70.8 ± 48.5 months (5.9 ± 4 years) with extremes ranging from 3 to 300 months. The proportion of patients who had good treatment adherence was 68.06% (n = 196). Table 3 shows the distribution of treatment-related data.

Univariate and multivariate analyses

Living in an urban area significantly influenced poor blood pressure control (p = 0.04). There was a statistically significant correlation between the employed patients and poor blood pressure control (0.04). A sedentary lifestyle was associated with poor blood pressure control (p = 0.006). Dyslipidemia was statistically and significantly related to poor blood pressure control (p = 0.02). A multivariate logistic regression analysis found factors correlated with poor blood pressure control, such as living in an urban area (p = 0.01) and acute complications (p = 0.04) (Tables 4,5).

Table 3: Distribution of the treatment-related data of the study population.

Variables	Number	Percentage (%)
Protocol		
Dual therapy	165	57.29
Triple therapy	62	21.53
Quadruple therapy	21	7.29
Average duration of the treatment		70.8 ± 48.5 months (5.9 ± 4 years)
Good adherence	196	68.06

Table 4: Univariate analysis of the factors associated with poor blood pressure.

Variables	Numbers	Uncontrolled HTN	Controlled HTN	OR	P
Urban	253(88.1%)	126(91.9%)	127(84.6%)	2.1	0.04
Employment	280(97.2%)	136(99.2%)	144(95.3%)	6.6	0.04
Uneducated	128(44.4%)	65(47.4%)	63(41.7%)		0.3
Sedentary lifestyle	113(39.2%)	65(47.4%)	48(31.8%)	1.9	<0.01
Dyslipidemia	154(53.5%)	83(60.6%)	71(47%)	1.7	0.02
HTN duration : ≥15years	98(34%)	56(40.8%)	42(27.8%)	2.1	0.01
Acute complications	143(49.6%)	87(63.5%)	56(37.1%)	2.9	<0.01
Chronic complications	112(38.9%)	68(49.6%)	44(29.1%)	2.4	<0.01
Number of drugs taken					
Several times	105(36.4%)	64(46.7%)	41(27.1%)	2.3	0.03
Once	182(63.2%)	73(53.3%)	109(72.2%)		
Adherence					
Good	196(68.0%)	67(48,9%)	129(85.4%)	6.1	<0.01
Bad	92(31.9%)	70(51.1%)	22(14.5%)		

Discussion

Limits and constraints of our study

Using the cross-sectional method enabled us to ask patients all relevant questions and to observe various realities. Our presence among patients could have led to biases, and our guided questionnaire could have resulted in a loss of information. In addition, patients who did not give their favorable opinions could have contributed to increasing the sample size, as these were the same patients who were being followed up with. Despite these constraints, results were obtained that, when compared to the literature, allowed us to conduct the following discussion.

Frequency: Our study reported a frequency of 47.57% for patients with uncontrolled hypertension. Our results are similar to those of Yaméogo, et al. [11] in Burkina Faso and Mesli, et al. [13] in Morocco, who respectively found 54.2% and 50.4% of uncontrolled blood pressure readings. However, Siddikatou, et al. [14] in Cameroon, Schumann [15] in France, and El Kardoudi, et al. [16] in Morocco, respectively, found 65.1%, 66%, and 74.1% of patients with uncontrolled blood pressure readings. These results could be explained by changes in lifestyle and eating habits likely to influence blood pressure control. The studies conducted by El Kardoudi, et al. and Siddikatou, et al. had larger sample sizes and were all multicenter, unlike ours, which was single-center. Schumann's multicenter study also involved hypertensive patients followed up by general practitioners and cardiologists.

Age and gender: The average age was 60.16 ± 13.9 years, with extremes from 22 to 89 years. Our results were similar to those of Diop [7] in Senegal and Menanga [17] in Cameroon, who respectively found average ages of 61.06 ± 10.95 years and 61.1 ± 11 years. In both types of studies like ours, the study population included patients aged above 18 years suffering from high blood pressure. This could be explained by the fact that high blood pressure is more prevalent in older people. We found a female predominance among our patients, with 67.4% of women against 32.6% of men, corresponding to a sex ratio of 0.48. This result is similar to those of Millogo, et al. [18] in Burkina Faso and Hamoudi, et al. [19] in Tunisia, who respectively found a female predominance of 69.1% and 66.6% of women, and a sex ratio of 0.45 and 0.5. This female predominance could be explained by the fact that hormonal fluctuations throughout a woman's life can influence blood pressure and make blood pressure control difficult. In addition, some oral contraceptives can increase blood

Table 5: Multivariate analysis of the factors associated with poor blood pressure.

Variables	Effectifs	HTA non contrôlée	HTA contrôlée	AOR	IC à 95%	P
Résidence Urbaine	253(88,1%)	126(91,9%)	127(84,6%)	3,5	[0,1-4,7]	0,01
Emploi	280(97,2%)	136(99,2%)	144(95,3%)	3,4	[0,2-4]	0,9
Sédentarité	113(39,2%)	65(47,4%)	48(31,8%)	1,2	[0,7-2]	0,3
Dyslipidémie	154(53,5%)	83(60,6%)	71(47%)	0,8	[0,5-1,3]	0,4
Durée HTA : ≥15ans	98(34%)	56(40,8%)	42(27,8%)	1	[0,9-1]	0,7
Complications Aigues	143(49,6%)	87(63,5%)	56(37,1%)	1,7	[1-3,1]	0,04
Complications Chroniques	112(38,9%)	68(49,6%)	44(29,1%)	1	[0,6-1,8]	0,9
Plusieurs prises de médicaments	105(36,4%)	64(46,7%)	41(27,1%)	0,9	[0,5-1,6]	0,7
Mauvaise Observance	92(31,9%)	70(51,1%)	22(14,5%)	1,07	[0,8-1,9]	<0,01

pressure and make its control complex. Advanced age with the onset of menopause could also be a conducive environment for hypertension development.

Residence and educational level: The majority of the study population, representing 87.8% of cases, were living in urban areas. Our results are similar to those of Diop [7] in Senegal and Millogo, et al. [18] in Burkina Faso, who respectively found 81% and 87.8% of patients living in urban areas. This could be explained by the urban location of our study center, the developed lifestyle with reduced physical activities, the overcrowded cities, and the hierarchical structure of the healthcare system in Burkina Faso, which makes our study center a reference point.

Cardiovascular risk factors: More than half of the patients in our study had dyslipidemia (53.47% against 46.53%). Sedentary lifestyle and stress after dyslipidemia were also common (39.24% against 60.76%). These results are similar to those of Menanga, et al. [17] in Cameroon, who found that three-quarters of their study population had dyslipidemia, while 56% of them were physically inactive. This could be explained by the fact that dyslipidemia can lead to endothelial inflammation, the formation of atherosclerotic plaques, which reduce the lumen of blood vessels, likely to lead to elevated blood pressure. As for a sedentary lifestyle, physical inactivity could lead to poor blood circulation and weight gain, which causes resistance in the peripheral arteries, therefore leading to increased blood pressure and hence uncontrolled blood pressure.

Hypertension complications: Almost half of hypertensive patients in our study have experienced acute complications (49.65%), with strokes at the top of the list (69.9%), followed by hypertensive spikes (40.6%) and chronic complications in 38.9% of the population. These results could be explained by the fact that the majority of patients were referred to the department, and these patients most often had severe hypertension or hypertension resistant to standard treatments, which increases the risk of complications. In our study, patients had several cardiovascular risk factors such as dyslipidemia, sedentary lifestyle, and stress, which increase the likelihood of complications. In turn, acute and chronic complications could damage target organs (heart, kidneys, and brain), making it more difficult to manage hypertension. Patients may also have difficulties in normally complying with the prescribed regimen because of complications, which result in poor control.

Treatment-related aspects: Dual therapy (57.29%) was the most commonly used protocol in our population. Diop [7] in Senegal found similar results estimated at 52.4%. Mesli, et al. [13] in Morocco and Ikama, et al. [20] in Congo had results below ours, respectively estimated at 45% and 47% of dual therapy. This difference is due to the smaller sample size of Mesli, et al. These results could be explained by the fact that dual therapy leads to an increased efficacy.

The number of daily doses was fixed at one (63.19%). Diop found 72.8%, a rate similar to ours, which could be explained by prescribers' preference for a single daily dose, if possible, to ensure good treatment adherence.

Treatment adherence and side effects: More than half of the population of our study had good treatment adherence. This could explain why patients have understood the need for good treatment adherence.

Factors associated with blood pressure imbalance: In our study, residence in an urban area, the presence of acute complications, and poor treatment adherence were the factors associated with blood pressure imbalance. Living in an urban area was significantly associated with poor blood pressure control. Hypertensive patients living in urban areas were 3.5 times more likely to have uncontrolled hypertension. They may be exposed to high levels of stress, to a diet rich in fat and sugar, and to a lack of green spaces to practice physical exercise, all of which could influence blood pressure and lead to uncontrolled hypertension. In addition, higher population density could influence access to care for these hypertensive patients, leading to irregular monitoring and uncontrolled hypertension. The presence of acute complications such as stroke and hypertensive spikes was correlated with poor blood pressure control. 87 cases had uncontrolled hypertension over a total of 143 patients with acute complications. According to our study, such patients with acute complications are 1.7 times more likely to have uncontrolled hypertension. Acute complications could result from a sudden and significant increase in blood pressure, which could indicate resistance to antihypertensive drugs, resulting in poor control. Poor adherence was statistically

correlated with poor blood pressure control (1.07 x risk), which is well recognized and reported by some studies [11,16]. Poor treatment adherence is thought to be the cause of severe and treatment-resistant blood pressure rebounds, which have brought about poor blood pressure control. The following factors were only associated in univariate analysis: employment, sedentary lifestyle, dyslipidemia, duration of hypertension ≥15 years, presence of chronic complications, several antihypertensive medications taken by the patient, multiple daily doses of medication, and duration of treatment >10 years. Employment was significantly associated with poor blood pressure control in our univariate analysis. However, that was not the case in the multivariate analysis, probably due to a lack of power. Employment may be associated with occupational stress, since it can be a major source of stress, especially in high-responsibility jobs with tight deadlines or heavy workloads. Chronic stress is a well-proven risk factor for hypertension. In addition, certain noisy or polluted work environments can also contribute to an increase in blood pressure. A sedentary lifestyle was associated with poor blood pressure control in univariate analysis. Schumann's study in France [15] reported the same results. The study of Bahloul, et al. [21] in Tunisia reported an association between regular physical activity and good blood pressure control. Our results could therefore be explained by a lack of regular physical activity, which could be associated with an increase in body weight, abdominal fat, and a reduction in insulin sensitivity, likely to aggravate hypertension. Besides, physical inactivity could lead to a decrease in the artery lumen, which could affect blood flow regulation and blood pressure, leading to uncontrolled hypertension. Dyslipidemia was significantly associated with blood pressure only in univariate analysis. Schumann's study found that dyslipidemia was associated with poor blood pressure, with LDL levels ≥1.6 g/dl and HDL levels ≤0.4 g/dl, which were associated in univariate analysis, and only LDL levels ≥1.6 g/dl retained this association in multivariate analysis. The coexistence of hypertension and dyslipidemia could complicate blood pressure control; certain drugs used to treat dyslipidemia could have an impact on blood pressure and lead to poorly controlled hypertension. Hypertension lasting more than 15 years was correlated with poor blood pressure in univariate analysis. These results could be explained by the following factors: over time, some patients may develop resistance to antihypertensive drugs, meaning that these drugs will no longer be effective in lowering blood pressure; over the years, comorbidities such as metabolic disorders may arise, which could aggravate hypertension and make it difficult to control. The presence of chronic complications such as LVH, hypertensive retinopathy, stroke with stroke sequelae, and CRF was significantly associated with poor blood pressure control, but only in univariate analysis. Schumann's studies found more specifically that LVH was associated with poor blood pressure control.

Conclusion

This study highlights several determining factors of poor blood pressure control in hypertensive patients. Residence in an urban environment, the occurrence of acute complications such as stroke, hypertensive attacks, and poor therapeutic compliance appeared as factors associated with this poor blood pressure control.

These results highlight the importance of a more global approach for the management of high blood pressure, combining medical treatment, promotion of physical activity in urban areas, early screening of high blood pressure, and implementation of a therapeutic education program. Such strategies are essential to strengthen treatment adherence, improve blood pressure control, and consequently reduce the burden of cardiovascular diseases.

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