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Factors Associated with Blood Pressure Control among Outpatients Attending the Cardiology Department of the Libreville University Hospital Centre

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Abstract

Introduction: Complications of high blood pressure (HBP) are often linked to uncontrolled blood pressure in combination with other cardiovascular risk factors. The aim of this study was to assess the level of blood pressure control in hypertensive patients attending outpatient cardiology clinics and to identify the factors associated with this lack of control. **Patients and Methods**: This was a cross-sectional, analytical study conducted from 1 March to 1 April 2023, which consecutively included patients who had been treated for hypertension for at least one year. We calculated the average of three blood pressure readings for each patient in a seated position, taken at two-minute intervals on both arms. This enabled us to assess the overall level of blood pressure control. We did not use a method to calculate the sample size. **Results**: In total, we had 250 eligible patients; 120 patients were excluded based on the inclusion criteria, and 130 patients were included, of whom 81 were women, with a sex ratio of 0.59. The mean age was 58 ± 12.6 years (range 28 - 85 years). Other risk factors associated with hypertension were obesity in 67 patients (51.5%), a sedentary lifestyle in 59 patients (45.3%) and diabetes in 20 patients (15.3%). Fifty-seven patients (43.8%), 39 patients (30.0%) and 14 patients (10.8%) were receiving dual, triple and quadruple antihypertensive therapy, respectively. The proportion of uncontrolled blood pressure was 83.2%. After adjustment by logistic regression, the factors associated with uncontrolled hypertension were a sedentary lifestyle (OR = 3.4, 95% CI [0.5 - 2.6], $p < 0.0001$) and obesity (OR = 1.2, 95% CI [0.32 - 1.59], $p = 0.033$). **Conclusion**: The prevalence of uncontrolled hypertension is high despite health insurance coverage, and the factors associated with uncontrolled hy-

pertension were physical inactivity and obesity.

Keywords

Uncontrolled Hypertension, Sedentary Lifestyle, Obesity, Libreville

1. Introduction

High blood pressure (HBP) is defined as blood pressure readings of 140/90 mmHg or higher. It is the leading cause of death worldwide [1]. Of the 17 million annual deaths linked to cardiovascular disease, 9 million are attributable to complications of HBP [1]. Indeed, it is a major public health problem and a common reason for consultation in cardiology.

Globally, approximately 54% of strokes and 47% of ischaemic heart disease were attributable to uncontrolled hypertension [2].

In sub-Saharan Africa, certain external factors, including nutritional conditions, urbanisation and obesity, are cited as contributing to hypertension [3] [4].

However, studies published in Gabon and elsewhere highlight the impact of the often-initial complications associated with hypertension, particularly neurological and cardiac complications [5] [6]. Consequently, further information on the determinants of uncontrolled hypertension, such as the presence of other cardiovascular risk factors, is essential to guide management strategies and the setting of public health priorities. In Gabon, there is very little data assessing the level of blood pressure control, despite the National Health Insurance and Social Security Fund (CNAMGS) providing access to antihypertensive drugs at a reduced cost.

Hence, the purpose of this study was to assess the prevalence of uncontrolled hypertension and to identify associated factors among hypertensive patients receiving outpatient care in the cardiology department of the CHUL.

2. Patients and Methods

This was a cross-sectional, analytical study conducted from 1 March to 1 April 2023 (1 month) in the outpatient clinics of the cardiology department at the Libreville University Hospital. We consecutively enrolled patients who had been treated for hypertension for at least one year and who were all covered by the National Health Service and taking antihypertensive medication regularly. We calculated the average of three blood pressure readings for each patient in a seated position, taken at two-minute intervals on both arms, which enabled us to assess the overall level of blood pressure control.

Hypertension was defined as blood pressure readings of 140/90 mmHg or higher.

Uncontrolled hypertension was defined as the average of three blood pressure readings taken from both arms that were significantly higher than the therapeutic targets set by the European Society of Cardiology, namely 129 mmHg for systolic

and 89 mmHg for diastolic [7]. Blood pressure measurements were taken using an OMRON M3/M3 Comfort automatic blood pressure monitor manufactured in China, calibrated and validated by OMRON Healthcare and in accordance with the ESH, AAMI/ISO protocol.

Data were recorded on a data collection form during consultation hours.

The analysed variables were socio-demographic (gender, age) and known cardiovascular risk factors (obesity, physical inactivity, diabetes and dyslipidaemia). The overall level of control was recorded and assessed according to defined age groups (under 40 years, 41 - 60 years, 61 years and over).

Inclusion criteria.

- Patients who have had high blood pressure for one year.
- Health insurance coverage.
- Regular use of antihypertensive medication.

Definition of variables.

Obesity was defined as a body mass index (BMI) ≥ 30 kg/m^2.

Sedentary lifestyle was defined as a lack of physical activity for more than 30 minutes per day [8]. Active smoking was defined as a pack year of more than three years.

Dyslipidaemia was defined as an LDL cholesterol level greater than 0.7 g/L.

Monotherapy was defined as the use of a single antihypertensive drug.

Dual therapy was defined as the use of two drugs with different active ingredients.

Triple therapy was defined as the use of three drugs with different active ingredients.

Quadritherapy was defined as the use of four drugs with different active ingredients.

This study was conducted in accordance with current ethical principles, in line with the 1975 Helsinki Declaration [9]. Data were collected responsibly with the informed consent of the participants. Participation was entirely voluntary, and each participant was provided with clear and understandable information regarding the study's objectives, the procedures used, and the potential benefits and risks. The information collected was kept strictly confidential. The data were anonymised, and access to the data was restricted to the researchers involved in the study. The results were presented in aggregate form without individual identification. This study was conducted in accordance with the principles of respect for persons, beneficence and non-maleficence, justice and equity. This work was registered with the Institutional Ethics Committee of the University of Health Sciences in Libreville (CIE-USS).

3. Statistical Analysis

The data were analysed using STATA 11 software and were entered, digitised and collected via an electronic questionnaire (Kobocollect) hosted on the Kobotoolbox platform. The data were secured via an access link. Qualitative variables were pre-

sented as frequencies and percentages, and quantitative variables as means and standard deviations. The identification of factors associated with uncontrolled blood pressure was carried out using multivariate analysis via the Chi-square and Fisher's exact tests, with a significance threshold set at $p < 0.05$.

4. Results

In total, we had 250 eligible patients; 120 patients were excluded based on the inclusion criteria, leaving us with 130 patients. The mean age of the population was 58 years ± 12.6 years, ranging from 28 to 85 years. Women accounted for 62.3% of cases (n = 81), with a sex ratio of 0.60. Subjects under 40 years of age accounted for 7.7% (n = 10), patients aged 41 to 60 accounted for 51.9% (n = 67), and subjects aged 61 and over accounted for 40.3% (n = 52). Other cardiovascular risk factors (CVRF) associated with hypertension were obesity in 27.0% (n = 67) of cases, followed by a sedentary lifestyle and dyslipidaemia in 23.7% (n = 59) and 20.1% (n = 52) of cases, respectively. Occasional alcohol consumption was noted in 30.7% (n = 40) of cases (Table 1).

The current treatment regimen consisted of dual, triple, and quadruple antihypertensive therapy in 43.8% (n = 57), 30% (n = 39), and 10.8% (n = 14) of cases, respectively (Table 2). The proportion of uncontrolled patients was 83.2% (n = 108) and the proportion of controlled patients was 16.8%. Variables with a p-value < 0.20 in the bivariate analysis were included in the multivariate analysis. After adjustment using logistic regression, the variables included were physical inactivity (OR = 3.4, 95% CI [0.5 - 2.6], $p < 0.0001$) and obesity (OR = 1.2, 95% CI [0.32 - 1.59], $p = 0.033$) (Table 3).

Table 1. Distribution of cardiovascular risk factors associated with hypertension.

History	n = 248	%
Smoking	7	2.82
Diabetes	20	15.3
Dyslipidaemia	52	40.0
Sedentary lifestyle	59	45.3
Obesity	67	51.5

Table 2. Treatment regimens.

Number of antihypertensive drugs	N = 130	%
Quadruple therapy	16	12.3
Monotherapy	18	13.6
Triple therapy	39	30
Dual therapy	57	43.8

Table 3. Factors associated with uncontrolled blood pressure.

Variables	Blood pressure control. OR		p-value
	Yes	No	
Gender			1.49
Male	9 (18.3%)	40 (81.6%) 0.53	
Female	24 (29.6%)	57 (70.3%)	
Age			0.16
Under 40	1 (10%)	9 (90%)	
41 - 60	21 (30.8%)	47 (69.1%)	
61 and over	11 (21.1%)	41 (78.8%)	
Diabetes	6 (30%)	14 (70%) 1.32	0.05
Dyslipidaemia	16 (30.8%)	36 (69.2%) 1.45	0.3
Obesity	15 (22.3%)	52 (77.6%) 1.2	0.033
Sedentary lifestyle	17 (28.8%)	42 (71.1%) 3.4	<0.0001

5. Discussion

The average age of hypertensive patients attending outpatient clinics at the CHUL is consistent with studies conducted in Congo-Brazzaville by Ikama *et al.* and in Togo by Atta *et al.* [10] [11], who found average ages of 53.8 ± 9.7 years and 52 ± 13 years respectively. We note that these age groups overlap, which may be explained by the fact that high blood pressure is currently affecting increasingly younger individuals. We observed a predominance of women in our study, as did Ikama, who reported a female-to-male sex ratio of 1.64 [10]. These results reflect the current prevalence of hypertension and cardiovascular disease among women, as noted by Mbaye *et al.* in Senegal [12]. The age group reported in this study comprises relatively young individuals aged 45 to 59, similar to Sako *et al.* in Congo [13] and Ba *et al.* in Mali [14], who reported an age group under 60. These results show that hypertension is increasingly a condition affecting young people in sub-Saharan Africa. Obesity was the most prevalent cardiovascular risk factor in our study, suggesting that it may be a contributing factor to the development of high blood pressure in Gabon. The obesity rate recorded in this study was nearly twice that reported by Atta *et al.* in Senegal, which stood at 27.4%. This finding highlights the problem of obesity in Gabon. Furthermore, data from the literature show that its association with hypertension increases cardiovascular risk and constitutes a factor in poor blood pressure control [15]. Combating obesity and a sedentary lifestyle by promoting regular physical activity and a healthy diet is a national priority [16].

The rate of uncontrolled hypertension was 83.2% in our study, slightly higher than the rates reported in Morocco [17] and Cameroon [18].

The same finding was noted in the VITARAA study conducted in South Kivu (Congo), where the proportion of uncontrolled hypertension was 86.4% [19]. This

rate of uncontrolled hypertension was, however, lower (less than 60%) in Burkina Faso according to Yameogo *et al.* (54.2%), and the associated factors were age over 60, low socioeconomic status and non-adherence to treatment [20]. This demonstrates that the rate of uncontrolled hypertension and the associated factors vary from one region to another in sub-Saharan Africa.

Although the CNAMGS covers all patients by reimbursing over 80% of the cost of antihypertensive treatment in this study, the rate of uncontrolled hypertension remains high. The most common factors associated with uncontrolled hypertension were obesity, a sedentary lifestyle and diabetes. Adherence to blood pressure targets as defined by the European Society of Cardiology must be a priority. Uncontrolled hypertension could also indicate a lack of therapeutic response from practitioners, as reported in other African studies, or a lack of therapeutic adjustment or the maintenance of the same dosage when blood pressure control is not achieved. However, the therapeutic education of African patients with hypertension remains a challenge, as adherence to treatment is difficult, particularly in societies where customs and traditions are deeply ingrained, forcing some patients to stop treatment and turn to traditional medicine.

6. Limitations and Advantages of the Study

This study has limitations due to its single-centre nature, small sample size and the fact that it is a cross-sectional study, which limits the generalisability of these results to the general population. However, it has the advantage of being the first study published in Gabon to assess the prevalence of uncontrolled hypertension. These findings could help improve the management and prognosis of our hypertensive patients by tackling cardiovascular risk factors such as obesity and a sedentary lifestyle.

7. Conclusion

The prevalence of uncontrolled hypertension was high among patients attending the cardiology outpatient clinic. This work should be continued on a national scale to obtain nationwide figures. The factors associated with this uncontrolled hypertension were a sedentary lifestyle and obesity. In addition to facilitating access to antihypertensive drugs, combating obesity through regular physical activity is a priority. Promoting therapeutic education is essential.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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