

Blood Pressure and Control Factor in Hypertensives Monitored at the Referral Hospital in Boma. Democratic Republic of the Congo

Blaise Makoso Nimi^{1,2}, Bernadette Nzuzi Phaka³, Rosette Pfuti Nlandu^{2,4} and Fabrice Nlandu Thamba^{2,4}

¹ Division of Cardiology, University of Kinshasa Hospital, Kinshasa School of Medicine, University of Kinshasa, Kinshasa, The Democratic Republic of the Congo

² University Kasa Vubu School of Medicine, Boma, DR Congo

³ Higher Institute of Medical Technology (ISTM), Tshela

⁴ Boma Hospital, DR Congo

Abstract:-

➤ *Background and Aim:*

Uncontrolled hypertension remains a significant problem in daily clinical practice worldwide.

Few data are available on blood pressure control in hospitals. The aim of this study was the frequency of uncontrolled hypertension and associated risk factors in hypertensive patients followed at the general referral hospital of Boma in the province of Kongo Central in the Democratic Republic of Congo

➤ *Methods:*

From January 1 to May 31, 2019; we conducted a cross-sectional and descriptive study at the Boma reference hospital located in the southeast and 440 Km from Kinshasa, the capital of DR Congo.

Included was any hypertensive patient over 18 years and informed consent. Information on demographic parameters, behavioral lifestyles, anthropometric and biological (blood sugar, creatinine, urine strip and lipid profile) and blood pressure (BP) measurements was obtained. Hypertension was defined as an average of two BP $\geq 140/90$ mmHg. Independent factors associated with control hypertension were identified using logistic regression analysis. $P < 0.05$ defined the level of statistical significance.

➤ *Results:*

The prevalence of uncontrolled hypertension was 62 % BP control was observed in 150 (38.0%) of 395 treated hypertensive participants mainly in men than women (68.3 vs 53.3 %; $p = 0.001$). Age < 60 years ($p = 0.005$), no smoking ($p = 0.047$), no Central obesity ($p = 0.008$), CKD (stage 1 vs 2) ($p = 0.065$), and no hypercholesterolemia ($p = 0.014$) emerged as associated with control hypertension.

➤ *Conclusion*

Uncontrolled hypertension was common in our hospitals. Therapeutic lifestyle changes and pharmacological treatment are necessary for hypertensive participants.

Keywords:- Hypertension, Control, Risk, Factors, Hospital, Boma.

I. INTRODUCTION

Since independence, the prevalence of hypertension (HTN) has steadily increased in Sub-Saharan Africa (SSA) from $< 5\%$ to 40% to day and is a major health problem [1].

Several reasons are cited to justify this increase among other, rapid and uncontrolled urbanization, physical inactivity, obesity and above all the abandonment of the traditional way of life [2].

In SSA, HTN is the primary modifiable and preventable risk factor responsible for stroke, heart failure and kidney disease [3,4].

Adequate control of HTN is critical to prevent cardiovascular events. Several factors of non-control of HTN are reported in the literature among which advancement in age, alcoholism, physical inactivity, therapeutic inertia, drugs of dubious quality, poverty and without forgetting chronic renal disease [5-8].

Although there are some data showing differences in the prevalence, awareness and degree of control of HTN in low and middle income countries, studies agree that there is an effort to be made to wait the level acceptable [9-11].

In the Democratic Republic of the Congo (DRC), then nationwide prevalence of hypertension, in studies conducted in some urban and rural areas have reported a prevalence of hypertension ranging from 30% to 40% [9,12-16].

In hospitals, the prevalence of uncontrolled HTN is very high, indeed, Kika et al in Kinshasa found that 77.5% of hypertensive patients have uncontrolled HTN [17], Katchunga et al, in Southern Kivu (DRC), found that 86.4% of hypertensive patients were uncontrolled [15].

The good HTN management can save patients from life-threatening complications. To achieve this, adequate treatment and taking care of other cardiovascular risk factors. To our knowledge, very few studies have been

carried out the hospital in order to list the factors of no control of HTN, reason for being in this study.

II. METHOD

From January 1 to May 31, 2019; we conducted a cross-sectional and descriptive study at the Boma reference hospital located in the southeast and 440 Km from Kinshasa, the capital of DR Congo.

Included was any hypertensive patient over 18 years of age on antihypertensive medication in the past two years. The parameters of interest were age, sex, the notion of taking tobacco and alcohol, physical examination including blood pressure, height, weight, the waist and the biological parameter : blood sugar, creatinine, urine strip and lipid profile.

The anthropometric measurements (such as body weight, waist circumference, height) blood pressure, and pulse rate were collected by well-trained Medical students. Blood pressure was measured using digital blood pressure measurement devices (OMRON MIT5 Connect, Kyoto, Japan). The average of the two measurements were used in the analysis.

Height was measured, while the participants were in an upright position without shoes, by using a flexible tape meter (Hemostyl, Sulzbach, Germany). Body weight was also measured with individuals wearing light clothing or standing without shoes using a digital weighing scale (Deluxe GBS-721; Seca Deutschland, Hamburg, Germany). Body mass index (BMI) was computed as weight in kilograms divided by height in meters squared (Kg/m^2).

A flexible tape meter was used to measure the waist at the level directly above the iliac crest.

➤ Operational definitions

BP control BP <140 mmHg while on treatment among those on treatment; isolated systolic, isolated and systolic-diastolic uncontrolled BP in treated patients were defined as SBP \geq 140 mmHg and DBP <90 mmHg, SBP <140 mmHg and DBP \geq 90 mmHg and SBP \geq 140 mmHg and DBP \geq 90 mmHg, respectively [18]. Diabetes was defined as fasting blood glucose, 110 mg/dl or history of antidiabetic treatment [19]. Body Mass Index (BMI): computed from the height and weight of the respondent - weight divided by height squared (Kg/m^2). The BMI was further classified into four categories; underweight (BMI <18.5 Kg/m^2), normal (BMI 18.5-24.99 Kg/m^2), overweight (BMI 25 - 29.99 Kg/m^2) and obese (BMI \geq 30 Kg/m^2) [20].

Waist circumference (WC) was used as surrogate for abdominal obesity, defined as a WC value > 94 cm in men and > 80 cm in women [21].

Smoking was defined as current use of smoked or smokeless tobacco [22].

Talking alcohol was defined as consumption of more than 1 standard drink (which is the amount of alcohol you find in a small beer, one glass of wine, or one tot of spirits per day for females and more than 2 standard drinks for males [23]).

While on their usual diet, a venous blood sample was taken from an antecubital vein for the determination of levels of cholesterol and its sub-fractions, and triglycerides using enzymatic methods (Biomérieux France). Low-density lipoprotein cholesterol (LDL-C) was calculated using the Friedewald formula [24]. For estimated glomerular filtration rate (eGFR) determinations, the abbreviated equation from the MDRD study was used. [25].

➤ Data analyses

Data were analyzed using Statistical Package for the Social Sciences (SPSS) version 21 for Windows (SPSS Inc., Chicago, IL, United States). Data were expressed as mean values \pm standard deviations (SD) for continuous variables. Frequencies (n) and percentages (%) were reported for categorical variables. Counts (frequency = n) and percentages (%) were reported for categorical variables. Percentages were compared using the chi-square test. The logistic regression model analysis adjusted. A p-value of < 0.05.

➤ Ethical considerations

The study protocol was reviewed and approved by the institutional review board of the Kinshasa School of Public Health. All study participants provided written informed consent.

III. RESULTS

➤ Table 1 General characteristics

Of the 395 participants, 230 (58.2%) were males while 165 (41.8%) were females. Their mean age was 51.3 ± 12.1 years with 33.7%, 23.0%, 13.4%, 9.6% and 20.3% participants aged respectively < 30 years, 30–39 years, 40–49 years, 50–59 years and \geq 60 years. The proportion of unemployed, married, single, secondary education level and low SES participants was 43.0%, 46.6%, 59.0%, and 63.5%, respectively.

Average levels of SBP, DBP, MAP, WC, BMI, blood glucose, Total Cholesterol, Triglyceride, 24 hour protein, Blood Creatinine mg/dl, DFGe-MDRD were 125.9 ± 18 , mmHg, 81.1 ± 10.7 mmHg, 96.0 ± 12.3 mmHg, 25.1 ± 4.9 Kg/m^2 , 88.9 ± 12.3 cm and 184.4 ± 76.2 mg/dl, 174.9 ± 48.3 mg/L, 100.8 ± 50.7 mg/dl, 154.9 ± 48.8 g/dl, 1.08 ± 0.34 mg/dl and 94.8 ± 40.2 ml/1.72 m^2 respectively.

➤ Table 2 summarizes

By including the risk factors between patients with controlled and uncontrolled HTN, the study reports that the uncontrolled had significantly elevated, notion of tobacco use (93.5 vs 84.0%), Abdominal obesity (53.5 vs 32.5%), 24 h Prot (320.6 ± 75.7 vs 53.4 ± 11.9 mg/dl), DFGe-MDRD (102.8 ± 45.7 vs 81.6 ± 24.3 ml/1.72 m^2 of body

surface area were cardiovascular risk factors most frequently reported by the participants.

This study identified that out of all hypertensive therapy, the antihypertensive regimen was based on 1 and 2 antihypertensive drugs in 245 (62.0%) and 150 (38.0%) treated hypertensive participants, respectively; no participant was receiving ≥ 3 antihypertensive drugs.

In those receiving one antihypertensive drug, calcium channel blockers (69.4%) was the drug class most frequently reported by participants whereas the combination of calcium channel blockers (CCB) and angiotensin converting enzyme inhibitors (ACEIs) (21.6%) was most frequently mentioned by those receiving two drugs.

BP control was observed in 150 (38.0%) of 395 treated hypertensive participants mainly in men than women (68.3 vs 53.3 %; $p=0.001$).

Systolic-diastolic uncontrolled hypertension (52.7%) was the type most frequently encountered among those with no BP control

In univariable logistic regression analysis, age ≤ 60 years, no smoking, no obesity, chronic kidney disease stage 1 or 2 and the absence of hypercholesterolemia were associated with controlled BP.

In multivariate analysis (Table 6), the strength of the associations observed in univariate analysis persisted only for older age <60 years [aOR 3.43 (1.42-4.84); $p=0.005$], no smoking [aOR 4.91(1.32-11.32); $p=0.047$], no Central obesity [aOR 3.30(1.49-6.49); $p=0.008$], CKD (stage 1 vs 2) [aOR 1.017(0.99-1.04); $p=0.065$], and no hypercholesterolemia [aOR 2.20(1.76-6.35); $p= 0.014$],

IV. DISCUSSION

This study first discovers that 4/5 of hypertensive is under age of 60, 65.8% drink alcohol, 89.9 % smoke and 45.6% have central obesity. Second, the men was more received at the hospital, the blood glucose, the total cholesterol and the glomerular filtration rate were higher in the men than the women. Third, age < 60 years, no smoking, no central obesity and no hypercholesterolemia emerged as a factor in controlling hypertension. By comparing controlled hypertensive to uncontrolled patients, the study discovered that the uncontrolled patients had a statistically significant notion of greater tobacco use, central obesity and proteinuria. socio-demographic factors such as age and level of education, marital status and socio-economic level were significantly associated with uncontrolled hypertension in this study, which is reported in several other studies

In this study, 62.0% of patients had uncontrolled hypertension. This observation agrees with previous reports highlighting the fact that in most countries, less than 20% of patients achieve BP goals and therapy with a

single antihypertensive agent fails to achieve BP goals in up to 80% of patients [1]

The prevalence of uncontrolled hypertension observed in the present study was similar than that reported by Dennison et al. (64%)[26], Rayner et al. (60.2%)[27].and by Abiodun et al .62.3%, (67%) [28]. It lower than that reported by Mutua et al (66.4%) [29], by Ayodele et al. (68.6%) [30] Sani et al. (67%)[31], Onwemu et al. (70.4%) [32] and Kika et al in DRC (77.5%) .It was higher than that reported by Sangsuwan et al (53.4%) [33], Olowe et al (51%) [34], Jafar et al (58.0%) [35], Sarfo et al (57.7%) [36] and Ojo et al (53.6%) [37]

The differences in these studies can be justified by the media, the different sample sizes, the references retained as control (140/90 and BP.130 / 80 mmHg), and finally the co-morbidity in the presence (CKD and DM) and without forgetting the quality of the drugs which differs from country to country

The majority of treated participants were receiving monotherapy with mainly calcium channel blockers.

So current recommendations require debiting treatment with low-dose, fixed-dose dual therapy in order to avoid complications and obtain good adherence to treatment [18], is conceptually rationale, the use of monotherapy in the present study where hypertension is associated with high to very high 10 years global cardiovascular risk is not rationale and may translate therapeutic inertia from caregivers [38].

Age < 60 years, no smoking, no central obesity and no hypercholesterolemia emerged as a factor in controlling hypertension.

Uncontrolled SBP is more frequent and its frequency increases with advancing age, especially after 60 years.

Older age has been reported to be one of the most powerful cardiovascular risk factors through oxidative stress-induced endothelial dysfunction [39] and subsequent vascular remodeling as well as the coexistence of multiple cardiovascular risk factors via insulin resistance [40].

Smoking [41] and overweight/obesity are well-known traditional risk factors sharing insulin resistance, sympathetic nervous (SNS) and renin angiotensin aldosterone (RAAS) systems, oxidative stress and subsequent inflammation and endothelial dysfunction as a common pathogenic pathway for cardiac and vascular damage [42].

The present study confirms that the absence of hypercholesterolemia plays an important role in the control of hypo-dependent hypertension in black Africans [43]. Therefore, this could be explained by the absence of fat in the vessels causing good compliance [44].

V. CONCLUSION

Uncontrolled hypertension was frequent in the present series of cases, the causes of which can be, inter alia, therapeutic inertia or an increase in effective management in order to avoid complications.

ACKNOWLEDGMENT

The authors wish to express their deep gratitude to the authorities and academic staff of Kasa Vubu University in Boma for their invaluable help. We are deeply redevelopable to all students for their commitment to the reuse of the site of this survey.

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ANNEXES

Variables	Over All n = 395	HUncontrolled n=245	Controlled n = 150	P
Age, years	51,3±12,1	55,9±9,3	48,4±12,8	0.007
Age categories, n(%)				<0.001
< 30 years	133(33.7)	80(32.7)	53(35.3)	
30-39 years	91(23.0)	57(23.3)	34(22.7)	
40-49 years	53(13.4)	28(11.4)	25(16.7)	
50-59 years	38(9.6)	15(6.1)	23(15.3)	
≥60 years	80 (20.3)	65 (26.5)	15(10.0)	
Gender, n (%)				0.505
Male	230(58.2)	140(57,1)	90(60,0)	
Female	165(41.8)	105(42,9)	60(40,0)	
Residence, n(%)				0.263
Urban	101(25.6)	62(25.3)	39(26.0)	
Rural	294(74.4)	183(74.7)	111(74.0)	
Marital status, n(%)				<0.001
Married	170(43.0)	95(38.8)	75(50.0)	
Divorced	11(2.8)	5(2.0)	6(4.0)	
Widow	30(7.6)	9(3.7)	21(14.0)	
Single	184(46.6)	136(55.5)	48(32.0)	
Education level, n(%)				<0.001
Primary/no	79(20.0)	40(16.3)	39(26.0)	
Secondary	233(59.0)	152(62.0)	81(54.0)	
University/Superior	83(21.0)	53(21.7)	30(20.5)	
SES, n(%)				0.018
Low	251(63.5)	160(65.3)	91(60.7)	
Middle	111(28.1)	67(27.3)	44(29.3)	
High	33(8.3)	18(7.4)	15(10.0)	
BMI, Kg/m ²	25,1±4,9	25,8±3,9	24,7±5,3	0,311
WC, cm	88,9±12,3	91,1±11,4	87,6±12,8	0.230
SBP, mmHg	125,9±18,2	141,9±14,3	116,2±12,5	<0.001
DBP, mmHg	81,1±10,7	89,8±7,2	75,7±8,9	<0.001
MAP, mmHg	96,0±12,3	107,1±7,0	89,2±9,5	<0.001
Chol T	174,9±48,3	180,9±43,1	171,2±51,3	<0.389
LDL	116,3±44,4	117,7±37,4	115,5±48,5	0.827
HDL	38,5±16,2	42,2±17,6	36,2±14,9	0.112
Trig	100,8±50,7	105,4±58,9	97,9±45,4	0.530
Prot 24 h	154,9±48,8	320,6±75,7	53,4±11,9	0.017
Blood Creat mg/dl	1,08±0,34	1,15±0,3	1,04±0,4	0.148
DFGe-MDRD	94,8±40,2	102,8±45,7	81,6±24,3	0.022
Blood glucose, mg/dl	184,4±76,2	185,9±73,9	183,4±78,3	0.886

Table 1:- Sociodemographic, biological and clinical characteristics of hypertensive patients

Data are expressed as mean ± standard deviation, median (interquartile range) absolute (n) and relative (in percent) frequency. Abbreviations: M, male F, female SES, socioeconomic status BMI, body mass index WC, waist circumference SBP, systolic blood pressure DBP, diastolic

Variable	N	All	Male	Female	P
Drug regimen/class	395		230	165	< 0.001
1 drug, n(%)		245(62.0)	157(68.3)	88(53.3)	
CCB		170(69.4)	54(54.0)	146(55.9)	
ACEI		53(21.6)	17(17.0)	26(10.0)	
Loop diuretic		7(2.9)	2(2.0)	3(1.1)	
ARA II		6(2.5)	1(1.0)	5(1.9)	
Betablocker		5(2.0)	2(2.0)	3(1.1)	
Thiazide-like		4(1.6)	2(2.0)	2(0.8)	
2 drugs, n(%)		150 (38.0)	73(31.7)	77(46.7)	
CCB + ACEI		116(77.4)	65(89.0)	51(66.2)	
CCB +Betablocker		20(13.3)	7(9.6)	3(3.9)	
CCB + Thiazide like		14(9.3)	1(1.4)	13(16.9)	
BP control, n(%)	395		230	165	<0,001
No		245(62.0)	157(39.7)	88(22.3)	
Yes		150(38.0)	73(18.5)	77(19.5)	
No BP control types, n(%)	245		157	88	0.001
Isolated systolic		38(15.5)	17(10.8)	21(23.9)	
Isolated diastolic		78(31.8)	62(39.5)	16(18.1)	
Systolic/diastolic		129(52.7)	78(49.7)	51(58.0)	

Table 2:- treatment and control of hypertension among hypertensive participants

Data are expressed as absolute (n) and relative (in percent) frequencies. Abbreviations: CCB, calcium channel blocker ACEI, angiotensin converting enzyme inhibitor ARA, angiotensin type 1 receptor antagonist BP, blood pressure

Variables	Analyse univariée		Analyse multivariée	
	p	OR (IC95%)	p	ORa (IC95%)
Age		1		1
≥60 ans		1		1
<60 ans	0,0271	3,86(1,62-5,65)	0,005	3,43(1,42-4,84)
Tabac		1		1
Oui		1		1
Non	0,0432	4,95(1,37-10,37)	0,047	4,91(1,32-11,32)
Obésité abdominale		1		1
Oui		1		1
Non	0,0280	3,66(1,66-6,14)	0,008	3,30(1,49-6,49)
Stade de MRC		1		1
Stade 3, 4 ou 5		1		1
Stade 1 ou 2	0,032	10,20(1,01-10,34)	0,065	1,017(0,99-1,04)
Hypercholestérolémie		1		1
Oui		1		1
Non	0,009	2,30(1,85-6,21)	0,014	2,20(1,76-6,35)

Table 3:- Univariable and multivariable analysis of factors associated with controlled BP among hypertensive