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Hypertension in HIV-infected Patients at Boma Hospital in Democratic Republic of the Congo

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Abstract: Background and aim: The prevalence of hypertension is steadily increasing both in the general population and in patients living with HIV. The contributing factors are from one part identical to all and other parts linked to the HIV infection and its management. Given the complications related to ART, we list the cardiovascular risk factors, determine the proportion of hypertensive in people living with HIV before treatment with ART. Methods: this was a cross-sectional study carried out from January to May 2019 at the Boma hospital located south of Kinshasa in DR Congo. It included any patient who tested positive for HIV and over 18 years of age. The parameters of interest were; demographic data, lifestyle, anthropometric and biological measurements. Results: The prevalence of hypertension was 34.5%. Of the 115 patients with hypertension, 50 (43. 5%) knew their status and 65 (56.5%) were diagnosed during the study). low CD4 count (p=0.002), Diabetes mellitus (p=0.001), advanced age (p=0.001) and central obesity (p=0.009) emerged as mainrisk factors associated with hypertension in patients with HIV. Conclusion: hypertension is one of the cardiovascular risk factors present in seropositive patients and whose prevalence should attract the attention of both political and health authorities.

Keywords: Prevalence, Hypertension, HIV Infection, Boma

1. Introduction

Sub-Saharan Africa (SSA) is known to be carrying the heaviest burden of HIV/AIDS in the world [1, 2] and emerging aging (epidemiologic transition), new cardiovascular risks, double burden of malnutrition (nutrition transition) [3].

In 2019, 38 million people were living with the human immunodeficiency virus (PLHIV), 26 million of them are living with SSA [4]. People living with HIV (PLWH) have an additional challenge, the emergence of chronic diseases including high blood pressure. Its prevalence continues to increase in the general population but particularly among PLWH [5, 6]. This prevalence is also uneven, depending on the country, city and study. The result shows a higher prevalence of hypertension amongPLWH than the general population is not unanimous [7, 8]. However, the risk of developing hypertension is increased in PHAs due to HIV-related factors such as long-term effects of anti-retrovirals,hypercoagulation, atherosclerosis and systemic

inflammatory cytotokines [8–13] without forgetting the presence of other cardiovascular risk factors known to all such as alcoholism, smoking and physical inactivity [14]. So several studies have been carried out in high-income countries on the prevalence of HTN among PLWH [15-18], data on HTN among PLWH before antiretroviral therapy in sub-Saharan Africa are still limited. The limited data available report the prevalence of hypertension in patients already on antiretroviral therapy.

In DRC prevalence of HIV infection is 1.2% [19-22], no studies have evaluated the prevalence of HTN in patients living with HIV prior to taking ARVs. However, a comparison of CVD frequency reported a prevalence of 20%, 17.4% and 16.7% respectively of chronic renal failure, heart failure and stroke among PLWH.

In this study, we aim to list the cardiovascular risk factors in the group testing HIV positive before starting ART in order to better assess these factors after taking ART.

1.1. Method

From January 1 to December 31, 2019; We conducted a cross-sectional and descriptive study at the Boma referral hospital located in the south-east and 440 km from Kinshasa, the capital of DR Congo. All seropositive patients under the age of 18 who had not yet started ART treatment were included.

Socio-demographic parameters (age, sex, concept of tobacco consumption, alcohol, physical activity, level of education and socio-economic level), physical examination including blood pressure, height, weight, height and biological parameter: glycemia,creatinine, and lipid profile have been taken.

1.2. Operational Definitions

Hypertension was defined as blood pressure ≥140 / ≥90mmHg [23].

Diabetes was defined as fasting blood glucose, 110 mg/ dl or history of antidiabetic treatment [24].

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 ≥30 Kg/m^2 [25]. Waist circumference (WC) was used as surrogate for abdominal obesity, defined as a WC value > 94 cm in men and > 80 cm in women [26]. Smoking was defined as current use of smoked or smokeless tobacco [27]. 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 [28]. While on their usual diet, a venous blood sample wastaken from an antecubital vein for the determination of levelsof cholesterol and its sub-fractions, and triglycerides using enzymatic methods (Biomérieux France). Low-density lipoprotein cholesterol (LDL-C) was calculatedusing the Friedewald formula. [29].

1.3. Data Analyses

Data were analyzed using Statistical Package for the Social Sciences (SPSS) version 21 for Windows. Data were expressed as mean values±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. A p-value of < 0.05.

1.4. Ethical Considerations

The study protocol was approved by the ethics committee of the Ministry of Health. All participants provided written informed consent.

2. Results

Of the 333 participants, 231 (69.4%) were Females while 102 (30.6%) were males, with a sex ratio of 2.3 F/1 H. Their mean age was 47.7±14.9 years with 10.8%, 12.6%, 58.6% and 18.0% participants aged participants aged respectively < 20 years, 21–40 years, 41–60 years and ≥ 60 years.

The proportion of unemployed, married, single, Primary/noeducation level and low SES participants was 46.7%, 37.9%, 23.9%, 65.0% and 59.7%, respectively with a significant difference between men and women. Average levels of SBP, DBP, PP, WC BMI, blood glucose, WBC (cells /mm^3), Blood Creatmg/dl, CD4 and ESR were 118,0±14.5 mmHg, Total cholesterol, LDL, HDL were75.0±14.3 mmHg; 43.0±10.4mmHg, 81.7±11.9 cm, 23.5±4.9Kg/m^2, 118.1±31.1mg/dl, 5310.0±364.1 (cells/mm^3), 3.2±1.3 (mg/dl) 307.3±188.9 (cells/mm^3), 50.8±24.8, 174.9±48.3 (g/dl) 116.3±44.4 (g/dl) and 38.5±16.2 (g/dl) respectively.

The prevalence of hypertension was 34.5%. Of the 115 patients with hypertension, 50 (43. 5%) knew their status and 65 (56.5%) were diagnosed during the study). Comparing the two groups, hypertensive people had significantly HF-DM, HF-MCV, Smoking, Physical inactivity, Menopause, Overweight, Obesity, Central obesity, n (%) and low CD4 count. (table 2 and figure 1).

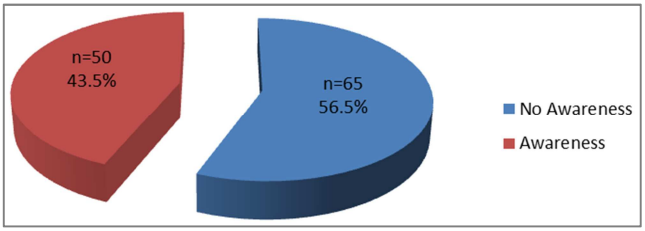

Figure 1. *Frequency of awareness of HBP.*

Table 1. *General characteristics of the study population.*

Variables	Over Alln=333	Malen=102	Femalen=231	P
Age yearsAge categories, n (%)	47.7±14.9	48.4±12.8	55.9±9.3	<0.001 <0.001
< 20 years	36 (10,8)	15 (14,7)	21 (9,1)	
21-40 years	42 (12,6)	18 (17,6)	24 (10,4)	
41-60 years	195 (58,6)	54 (52,9)	141 (61,0)	
≥60 years	60 (18,0)	15 (14,7)	45 (19,5)	
Occupation, n (%)				<0.001
Senior Staff	30 (8,3)	23 (22,5)	7 (3,0)	
Businessmen	96 (26,7)	45 (44,1)	51 (22,1)	
Students	22 (6,1)	9 (8,8)	13 (5,7)	
Public Servants	44 (12,2)	14 (13,7)	30 (13,0)	
Unemployed	141 (46,7)	11 (10,8)	130 (56,7)	
Marital status, n (%)				<0.001
Married	117 (37,2)	44 (79,3)	73 (31,6)	
Divorced	74 (20,6)	27 (4,6)	47 (20,3)	
Widow	66 (18,3)	21 (3,0)	45 (19,5)	
Single	76 (23,9)	20 (13,2)	56 (24,2)	
Education level, n (%)				<0.001
Primary/no	207 (65,0)	86 (15.1)	121 (38,1)	
Secondary	108 (30,0)	12 (54,4)	96 (28,8)	
University/Superior	18 (5,0)	4 (30,5)	14 (4,2)	
SES, n (%)				<0.001
Low	198 (59,7)	32 (59,1)	166 (49,8)	
Middle	90 (27.7)	48 (33,9)	42 (12,6)	
High	45 (12,6)	22 (7,0)	23 (6.9)	
BMI, Kg/m²	23.5±4.9	22.2±3.6	24.2±5.5	<0.001
WC, cm	81.7±11.9	79.7±10.7	85.4±13.2	<0.001
SBP, mmHg	118.0±14.5	116.3±13.7	122.4±15.6	<0.001
DBP, mmHg	75.0±14.3	78,8±14.6	73,5±13,9	<0.001
PP, mmHg	43.0±10.4	43.5±10.3	42.8±10.4	0.544
Blood glucose, mg/dl	118.1±31.1	118.2±31.9	117.9±29.7	0.929
WBC (cell /mm^3)	5310.0±364.1	4702.9±337.3	5550.0±372.0	0.047
Creatinine (mg/dl)	3.2±1.3	2.7±0,4	3.4±1.2	0.556
CD4 (cell/mm3)	307.3±188.9	273.7±155,4	320.6±199.4	0.034
SGPT (UI/l)	35.9±6.6	24.3±10,9	40.5±7.8	0.037
ESR (mm/1ère hr)	50.8±24.8	49.5±23,0	51.3±25.6	0.556
Chol T (g/dl)	174.9±48.3	171.2±51,3	180.9±43.1	0.389
LDL (g/dl)	116.3±44,4	115.5±48,5	117.7±37.4	0.827
HDL (g/dl)	38.5±16.2	36.2±14.9	42.2±17.6	0.112

Table 2. *Prevalence of hypertension among HIV-infected patients.*

CHARACTERISTICS	Yes (n=115)	No (n=218)	p
Age >55 H/45 F, n (%)	96 (83,5)	208 (31,7)	<0,001
Gender, n (%)			
M	46 (40)	56 (25,7)	0,001
F	69 (60)	162 (74,3)	
HF-HTA, n (%)	29 (25,2)	167 (25,6)	0,527
HF-DM, n (%)	17 (14,8)	17 (7,8)	0,001
HF-Obesite, n (%)	3 (2,6)	7 (3,2)	0,428
HF- MCV, n (%)	16 (4,3)	4 (1,8)	0,007
HF-MRC, n (%)	1 (0,9)	2 (0,9)	0,378
Smoking, n (%)	31 (27,0)	41 (18,8)	0,002
Alcohol intake, n (%)	38 (33,0)	200 (30,7)	0,258
Physical inactivity, n (%)	38 (33,0)	46 (21,1)	<0,001
Menopause, n (%)	47 (40,9)	36 (16,5)	<0,001
Overweight, n (%)	28 (24,3)	36 (16,5)	0,001
Obesity, n (%)	18 (15,7)	56 (8,7)	0,001
Central obesity, n (%)			
CD4 count (cells/mm3)	58 (50,4)	205 (31,2)	<0,001
≤ 350	86 (74,8	100 (45,9)	<0,001
> 350	29 (25,2)	118 (54,1)	

In univariate analysis (Table 3), cardiovascular risk factors significantly associated with hypertension were increased Age, Smoking, Physical inactivity, Menopause, CD4 cell (cells/mm^3), Overweight, Central obesity and le Diabetes mellitus. In multivariate analysis,In multivariate analysis, only advanced age, low CD4 cell count (cells / mm3), central obesity and diabetes mellitus emerged as determinants of hypertension. Indeed, the conversation of being associated with hypertension was approximately doubled in the presence of a low CD4 count (aOR 1.96; 95% CI 1.28-3.01; p=0.002) and Diabetes mellitus (aOR 2.34; 95% CI 1.47-3.71; p=0.001), it was approximately three-fold in the presence of advanced age (aOR 2.98; 95% CI 0.5-4.35; p=0.001) and central obesity (aOR 2.68; 95% CI 1.92-3.17; p=0.009). (Table 3).

Table 3. *Factors associated with hypertension among HIV-infected patients.*

Variables	Analyseunivarie		Analysemultivarie	
	p	OR (IC95%)	p	OR (IC95%)
Age >55 H/>45 F				
No		1		1
Yes	<0,001	4,72 (3,56-6,25)	<0,001	2,98 (2,05-4,35)
Smoking,				
No		1		1
Yes	0,002	1,61 (1,18-2,20)	0,153	1,34 (0,90-1,99)
Physical inactivity				
No		1		1
Yes	<0,001	1,87 (1,39-2,50)	0,121	1,36 (0,92-1,99)
Menopause				
No		1		1
Yes	<0,001	3,54 (2,64-4,77)	0,145	1,36 (0,90-2,05)
CD4 cell (cells/mm3)				
		1		1
>350	0,115	1,46 (0,18-1,97)	0,069	1,40 (0,97-2,02)
≤350	0,003	1,68 (1,19-2,38)	0,002	1,96 (1,28-3,01)
Overweight				
No		1		1
Yes	0,001	1,69 (1,23-2,34)	0,096	1,90 (0,17-3,06)
Central Obesity				
No		1		1
Yes	0,001	1,99 (1,33-2,96)	0,009	2,68 (1,92-3,17)
Diabetes mellitus				
No		1		1
Yes	<0,001	2,53 (1,73-3,69)	<0,001	2,34 (1,47-3,71)

3. Discussion

We report a prevalence of hypertension in a cohort of HIV-positive adults naïve to ART followed at the general hospital in the city ofBoma in the DRC.

The main findings of this survey are as follows. First, nearly 4 in 10 HIV-infected patients had hypertension. Second, hypertension was more common in women than in men. Third, increased age, obesity, diabetes mellitus, and CD4 count have emerged as cardiovascular risk factors specifically associated with hypertension.

The prevalence of hypertension found in the present survey is lower than that of 38% and 38.6% reported respectively in the Cameroonian study [30] and 38.6% in the South African study [31]. It is higher than that of 12.5%, [32], 18%[33], 27.9% [34] and 19.5% and 23.7% reported in Tanzania, Senegal, Uganda and South Africa respectively and finally; this prevalence is similar to that similar have been reported in southwest Ethiopia [35]. The majority of previous studies in sub-Saharan Africa have reported a prevalence of 20-35% of HTN among PLWH [30–36].

The difference observed in our study could be due to pre-existing cardiovascular risk factors, the variation in the lifestyle of the population and the size of the sample. The prevalence of hypertension among PLWH is identical to that reported in the general population in 2018 with a sample 10 times higher [37].

Older age, smoking, Smoking, Alcohol intake, Physical inactivity, MRC, HTN, DM were the most expensive cardiovascular risk factors for our patients.

The female gender predominates with a sex ratio of 2.5 this finding is reported by several African studies [29, 38].

This trend towards the feminization of HIV infection in our regions could be explained not only by anatomical vulnerability due to the fragility of the female genital mucosa and the frequent occurrence of microtrauma, financial precariousness and its consequences which expose women to financial dependence and unprotected sexual intercourse and ultimately the fact that women are screened more than men.

HIV prevalence was associated with socioeconomic level and low educational attainment. This observation is proved by many others previous studies [39, 40]. Indeed the lack of means and of employment expose to a compromising sexual behavior in the woman. Most of our

patients were married, of which 64.7% were women. This observation is reported by other studies [38]. HIV infection thus becoming a family problem, it is common among the unemployed (46.7%) [37]. Unemployment predisposes people to unconscious sexual behavior and especially exposes girls to HIV infection [41].

The prevalence of diabetes in this study is 13.3%, it is similar to that of the general population in Africa (2.2% – 7.0%) [42]. A lower prevalence has been reported by many other authors (1.8% to 2.9%) [43]. It was necessary to know this prevalence of diabetes mellitus because it is recognized that ART are involved in the development of insulin resistance and therefore of diabetes mellitus.

In the present study, women were more obese than men 20.9% vs. 17.6%. This result is much lower than the 49.6% found in the general population [44]. This result is similar to that reported in Kenya [44].

Obesity could be explained not only by the stigma of people who have lost weight but also by the tendency of the community to encourage HIV patients to be obese because weight loss could easily reveal their status. Higher prevalence is reported in Africa and demonstrates the importance of insulin resistance and diabetes mellitus in this low-income environment [45, 46].

4. Conclusion

We reported a high prevalence of hypertension among PLWH in Boma. Necessary measures must be taken by the leaders, the population as well as the caregivers concerning the lifestyle, prevention and therapeutic care.

Data are expressed as mean±standard deviation, median (interquartile range) absolute (n) and relative (in percent) frequency. Abbreviations: M, maleF, female SES, socioeconomic statusBMI, body mass indexWC, waist circumference SBP, systolic blood pressure DBP, diastolic blood pressure PP pulse pressure, WBC While globule, ESR sedimentation rate. In univariate analysis, advanced age, smoking, physical inactivity, gout, menopause, overweight, obesity, abdominal obesity, low CD4 count and diabetes mellitus emerged as the main ones determinants of hypertension.

Author's Contribution

BMN participated in survey conception and data collection and management; drafted the manuscript.

BLB, MMN, ANK, RPN, FNT and revised the manuscript. Benjamin B N P performed the sampling and laboratory analyzes.

Conflict of Interest

The authors declare no conflict of interest.

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