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Risk Factors for Cardiovascular Disease in a Congolise Art-Naive HIV Population: A Cross-Sectional Study.

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SUMMARY

Background and Aim: The identification and management of cardiovascular risk factors become a major problem in people living with HIV before but especially after taking ARVs, hence the need to list these factors before in order to establish the proportion due to treatment

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 patient infected with HIV aver 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.

Results: The most frequently reported cardiovascular risk factors:

Age ≥ 55 Years 43.3%, Smoking 45%, Alcohol intake, 46.7%, HTN 15% and DM 13.3% significant between the two sexes

Conclusion: Patients infected with HIV carry several cardiovascular risk factors

KEY WORDS: HIV infection, risk factors, Boma

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 fact 38 million people were living with Human immunodeficiency virus (PLWH) in 2019,of which 26 million PLWH are found in SSA, 19 million are women and despite making up around 10 % the population[4].

Cardiovascular pathologies have multiple etiologies and are determined by several risk factors. Several factors have been mentioned in several previous studies including age, sex, high blood pressure, diabetes mellitus, alcoholism, smoking, physical inactivity as being the most important cardiovascular risk factors. Quite recently, other risk factors, both biological and infectious, have been identified, in particular infectious agents or biochemical markers. These infectious factors are: Helicobater pylori, Hepatitis C, B, Cytomegalovirus (CMV), and of course Human Immunodeficiency Virus (HIV).

Cardiovascular risk factors and metabolic disorders are present in PLWH and log before starting antiretroviral (ARVs) and whose impact is underestimated with care remains mixed [5,6].

HIV-positive patient studies note cardiovascular disease (CVD), among which stroke, myocardial infarction , sudden cardiac death, have become a significant cause of death in PLWH in relation to the opportunistic diseases that are in clear decrease. CVD is

estimated to be responsible for 23.9 million deaths by 2030[7], 80% of the these deaths occur in low and middle income countries including Sub-Saharan Africa (SSA) [8,9].

Human immunodeficiency virus (HIV) infection dramatically increased the number of deaths. HIV infection induced direct or indirect mechanisms may induce diabetes mellitus, dyslipidemia, hypertension, lipodystrophy and endothelial dysfunction involved in the occurrence of cardiovascular events [10].

The coexistence of infectious diseases and non-communicable diseases is well documented in developed countries, and the intensity of this comorbidity is incomparable in SSA [11].

In RDC Despite low prevalence of HIV infection (1.2% in the general population [12-15].There are no studies that have assessed cardiovascular risk factors in patients living with HIV before taking ARVs. However, a comparison of the frequency of CVD reported a prevalence of 20%, 17.4% and 16.7% respectively of chronic renal failure, heart failure and stroke in 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

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.Any patient, HIV positive patients under the age of 18 without any notion of the price of ARVs. 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

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 ≥140 mmHg and DBP <90 mmHg, SBP <140 mmHg and DBP ≥90 mmHg and SBP ≥140 mmHg and DBP ≥90 mmHg, respectively [16].

Diabetes was defined as fasting blood glucose, 110 mg/ dl or history of antidiabetic treatment [17].

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 [18].Waist circumference (WC) was used as surrogate for abdominal obesity, defined as a WC value > 94 cm in men and > 80 cm in women [19].Smoking was defined as current use of smoked or smokeless tobacco [20]. 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 [20]. 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. [21].

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 ± 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.

Ethical considerations

The study protocol was reviewed and approved by the Ethical Committee of the Ministry of Health. All study participants provided written informed consent.

RESULTS

Table1. General characteristics

Of the 360 participants, 258 (71.7%) were Females while 102 (28.3%) were females. Their mean age was 51.3±12.1 years with 10.0 %, 11.7% , 61.7 % and 16.6 % participants aged participants aged respectively < 20 years, 21–40 years, 41–60years and ≥60 years. The proportion of unemployed, married, single, Primary/no education level and low SES participants was 46.7%,37.2%, 23.9%, 65 .0% and 59.7 %, respectively. Average levels of SBP, DBP, PP, WC BMI, blood glucose, WBC(elts/mm3), Blood Creat mg/dl, CD4 and ESR were 118,0±14.5 mmHg, Total cholesterol, LDL, HDL were 75.0±14.3 mmHg; 43.0±10.4mmHg , 81.7±11.9 cm, 23.5±4.9Kg/m², 118.1±31.1 mg/dl, 5310.0±364.1(elts/mm3), 3.2±1.3(mg/dl) 307.3±188.9(élts/mm3), 50.8±24.8, 174.9±48.3(g/dl)116.3±44.4 (g/dl) and 38.5±16.2 (g/dl) respectively.

Table 2 summarizes cardiovascular risk factor profile of the study population as a whole and by gender. In the study population as a whole, Age ≥ 55 Years 43.3%, Smoking 45 %, Alcohol intake, 46.7%,HTN 15% and DM 13.3% were cardiovascular risk factors most frequently reported by the participants.

Hypertension was observed in 54 (15.0%) participants (Fig.1).

Compared to Male participants, women were in average singificantly higher levels for BMI (24.1±5.5 vs 22,2±3,6 Kg/m²; p<0.001), WC (85.4±13.2 vs 79.7±10.7 cm; p<0.001) ,SBP (122.4±15.6 vs 116.3±13.7 mmHg; p<0.001) and WBC (5550.0±372.0 vs 4702.9±337.3 elts/mm^3;p =0,047). As risk factors, women have significantly Age ≥ 55 Years, Smoking,Alcohol intake,HTN, DM and Chronic kidney disease (CKD).

DISCUSSION

Cardiovascular disease is a wider complication of HIV infection. Most of the traditional risk factors for cardiovascular diseases present in the general population are also present in people infected with HIV. Hencethe need to list them before starting treatment which will allow us during the follow-up to know long-term impact of ARVs on our study population.

Our sample included 360 patients living with HIV. The average age of our study population of 47.7 ± 14.9 years, ¾ patient are women,

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 [22,23]

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 [24, 25]. 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 [23] which confirms that HIV infection is now a family problem. A high rate of unemployment was observed in this study (46.7%), as was reported in the general population in the same community [26].This high unemployment rate coupled with stigma related to HIV infection, may predispose the HIV infected people to high levels of stress [27].

This study found as cardiovascular risk factors in HIV positive patients: the advancement in age: 43.3%, Smoking: 45%, Alcohol intake: 46. 7%, HTN: 15%, DM:13.3%, Overweight :30% and CKD :12.5%.

The prevalence of hypertension in this relatively HIV positive population is high, but this may be a reflection of the prevalence of hypertension in the general population of this region, which is 35.5% in a recent study [26]. The study conducted in Mbuji Mayi in eastern D.R.Congo reported a prevalence of 11.5% [28].

High prevalence of hypertension in the HIV population is reported by other studies [29].HIV infection is associated with an important inflammatory process despite virological control, responsible for endothelial dysfunction [30].and precose atherosclerosis and ultimately arterial hypertension [31]. Sub-Saharan Africa, a lower prevalence of hypertension has been reported in HIV positive patients [32,33].The noted low prevalence of HTN is due to the fact that most HIV patients in low income countries are unaware of their hypertensive condition as is the general population of Africa and Boma in particular[34].This unknown HTN presents a significant risk of damage to target organs in both HIV-infected and uninfected patients, as does uncontrolled HTN.

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%)[35]. A lower prevalence has been reported by many other authors (1.8% to 2.9%) [36]. It was necessary to know this prevalence of diabetes mellitus because it is recognized that ARVs are involved in the development of insulin resistance and therefore of diabetes mellitus

In the present study women were found to be more obese than males 20.9% and 17.6%. This result is far lower than that reported in the general population which is 49.6% [37]. This result is similar to that of Kenya in which the prevalence of obesity among female HIV patients was higher than in HIV positive males [38].

Obesity in this population could be explained in part by a factor related to stigma; the tendency from the community is to encourage the HIV patients to be obese as loss of weight 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 [38,39].

Conclusion

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

AUTHOR'S CONTRIBUTION

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

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

ANNEXES

Table 1. General of the study population as

Table 2. Cardiovascular risk factor by gender

Figure1. Distribution of the study participants according to hypertension status.

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Table 1. General characteristics of the study population

Variables	Over All n = 360	Male n=102	Female n=258	P
Age years	47.7±14.9	48.4±12.8	55.9±9.3	<0.001
Age categories, n(%)				<0.001

< 20 years	36(10,0)	15(14,7)	21(8,1)	
21-40 years	42(11,7)	18(17,6)	24(9,3)	
41-60 years	222(61,7)	54(52,9)	168(65,1)	
≥60 years	60(16,6)	15(14,7)	45(17,5)	
Occupation, n(%)				<0.001
Senior Staff	30(8,3)	23(22,5)	7(2,7)	
Businessmen	96(26,7)	45(44,1)	51(19,8)	
Students	22(6,1)	9(8,8)	13(5,0)	
Public Servants	44(12,2)	14(13,7)	30(11,6)	
Unemployed	168(46,7)	11(10,8)	157(60,9)	
Marital status, n(%)				<0.001
Married	134(37,2)	44(79,3)	90(64,7)	
Divorced	74(20,6)	27(4,6)	47(8,5)	
Widow	66(18,3)	21(3,0)	45(20,4)	
Single	86(23,9)	20(13,2)	66(6,4)	
Education level, n(%)				<0.001
Primary/no	234(65 ,0)	86(15.1)	148(57,4)	
Secondary	108(30,0)	12(54,4)	96(37,2)	
University/Superior	18(5,0)	4(30,5)	14(5,4)	
SES, n(%)				<0.001
Low	215(59,7)	32(59,1)	183(70,9)	
Middle	100(27.7)	48(33,9)	52(20,2)	
High	45(12,6)	22(7,0)	23(8.9)	
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(élts/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 (élts/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

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 blood pressure PP pulse pressure , WBC While globule, ESR sedimentation rate.

Table 2. Cardiovascular risk factor by gender

FRCV	All N= 360	**Male** **n=102**	**Female** **n=258**	**p**

Age ≥ 55 Years	156 (43.3)	54(52.9)	102(39.5)	<0.001
Smoking, n(%)	162(45)	78(76.5)	84(32,6)	<0.001
Alcohol intake, n(%)	168 (46.7)	78(76,5)	90(34,9)	<0.001
Physical inactivity, n(%)	201(55.8)	87(85.2)	114(44.2)	<0.001
HTNn(%)	54(15)	30(29.4)	24(9.3)	<0.001
DMn(%)	48(13.3)	24(23.5)	24(9.3)	0.001
Obesity, n(%)	72(20)	18(17.6)	54(20.9)	0.292
Overweight, n(%)	108(30)	36(35.3)	72(27.9)	0.106
Ménopause	102(28.3)	-	102(39.5)	-
mic heart Diseasen(%)	30 (8.3)	12(11.8)	18(7.0)	0.104
MRC, n(%)	45(12.5)	15 (14.7)	30 (11.6)	0.001

Table 3. Awareness and treatment of hypertension among hypertensive participants

Variable	N	All	Male	Female	P
Awareness, n(%)	54		30	24	<0.001
No		31(57.4)	19(63.3)	12(50.0)	
Yes		23(42.6)	11(36.7)	12(50.0)	
Treatment, n(%)	23		11	12	0.476
No		13(56.5)	6(54.5)	7(58.3)	
Yes		10(44.5)	5(45.5)	5(41.7)	

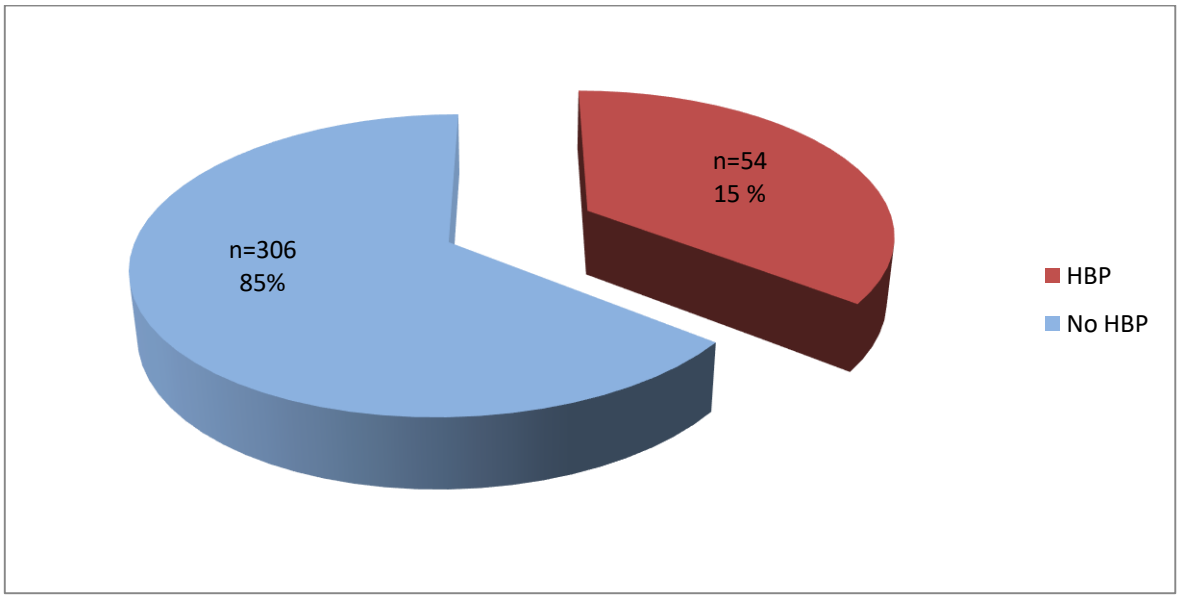

Fig.1.Distribution of the study participants according to hypertension status. Abbreviations: HBP, high blood pressure