Research Article

Clinical and biological profiles of older adults aged 50 and over compared to those under 50 in people living with HIV attending Kinshasa University Teaching Hospital (DR Congo)

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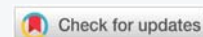
Abstract

Background: The survival of people living with HIV (PLWHIVs) is increased and Health systems will have to deal with the early-aging-associated medical conditions.

Objective: The objective of this study is to compare the clinical and biological profiles of PLWHIVs aged 50 and over and those aged less than 50 years.

Material and methods: This study conducted at Kinshasa University Teaching Hospital (KUTH) covers 6 years. The clinical and biological characteristics of PLWHIVs aged 50 and over were compared with those under 50. Statistical analysis used the means ± SD, the calculation of frequencies, Student's t-test and Chi-square.

Results: PLWHIVs aged 50 or over represented 35.1%. Their average age was 58.0 ± 4.8 years. Women predominate among those under 50 and men among those 50 and over. Married people were more numerous (54% among those under 50). There were more unemployed (50% of PLHIV under 50). Patients 50 years and older were significantly classified as WHO stage 4 with a high frequency of history of tuberculosis, genital herpes, high blood pressure, smoking, vomiting, hepatomegaly, moderate elevation of diastolic blood pressure (DBP) and sytolic blood pressure (SBP), tuberculosis and anemia.

Those under 50 had a significantly increased frequency of shingles, hepatitis B-hepatitis C, headaches and more survivals.

The mean of Hb, HDL-C, and CD4s+ were significantly lower in patients 50 years and older, and urea, LDL-C, and ALAT levels were significantly higher.

Conclusion: The average age was higher from 50 years old. These PLWHIVs were more frequently in WHO stage 4 with more common TB and anemia. Their Hb, HDL-C, and CD4s+ levels were lower while their urea, LDL-C and ALAT levels were significantly elevated.

Introduction

Since the use of HAART, PLWHIVs are living longer, healthier lives and have a better quality of life. Initially, when HIV infection was first described, PLWHIVs lived 1 to 2 years after diagnosis. Aging was therefore not a health problem of concern to health care providers [1]. Currently, when the diagnosis is made early, treatment is started in time according to WHO recommendations ("Test and Treat" strategy) [2]. This makes it possible to increase the survival of PLWHIVs and to test older adults who will be put on HAART. Some PLWHIVs have tested positive before age 50 and others after age 50 and over. In 2018, in the United States of America (USA) and dependent areas, 36% of PLWHIVs (out of an estimate of 1.1 million) were aged 55 and over [1] and 51% of them were aged 50 and over [3]. Among the newly diagnosed PLWHIVs in the same year (37,968), 17% were aged 50 and over (1 in 6 new HIV diagnoses) and were male. Currently, in the USA, nearly half of people newly diagnosed with HIV infection are aged 50 and over [1,3-6]. Elderly PLWHIVs commonly suffer from several life-threatening illnesses and several health care factors delay the diagnosis and treatment of these patients Bhata, et al. [6], in a systematic review and meta-analysis, present some characteristics of HIV infection. They estimated the overall prevalence of HIV infection in elderly people at 15.79% and the viral suppression rate at 11.524%. Very few of the elderly PLWHIVs were on HAART (38.643%). The retention rate and mortality in this category of patients represent 12.76% and 6.15% respectively. For Bhata, et al. retention of older PLWHIVs in developing countries is high, but few have suppressed their viral load. For them, age is an indicator of clinical progression of the disease and that age 50 and over is an independent prognostic factor influencing clinical death [6]. With the increase in life expectancy, PLWHIVs will experience aging, particularly in those who are 50 years old and over. PLWHIVs under HAART who have suppressed their viral load will experience clinical features common to aging with multiple chronic diseases and age-related medical conditions, polypharmacy, changes in physical and cognitive capacities and increased vulnerability to stress [1,7-9]. The complications associated with this prolonged survival are medical pathologies associated with HIV that do not classify AIDS because the morbid conditions classifying AIDS are reduced because of HAART. HIV infection is accompanied by immune activation and chronic inflammation. This increases the risk of developing age-related conditions. Among the conditions associated with chronic inflammation, there are cardiovascular diseases (ischaemic heart disease), type 2 diabetes mellitus, lyphoma and certain cancers, lung diseases, osteoporosis, intracranial haemorrhage, HIV-associated neurocognitive disorders (HAND) [1,8,9]. Liver damage has also been observed. This includes hepatitis B and C. PLWHIVs present with severe health conditions unrelated to HIV early on. These conditions are accelerated, accentuated and caused by various socio-economic and lifestyle factors (tobacco use, excessive alcohol consumption, lack of physical activity and insufficient diet).

Women should include menopause and declining bone density [7].

Chronic inflammation has been shown to persist even with HAART.

HIV and its treatment affect the brain. More than 50% of PLWHIVs have HAND. They present psychological distress, depression, deficits in attention, language and motor skills. Depression may interfere with adherence to HAART [7,8].

According to the CDC, in the USA, 35% of PLHIVs aged 50 and over are diagnosed with late-stage HIV (AIDS). They will face certain challenges including social isolation and concern. They are victims of stigma and discrimination. Their self-esteem drops. It has a negative impact on their life. This is one of the factors that will prevent them from disclosing their HIV status, not seeking treatment, or opting out of care [1,7].

In Canada, Europe and Asia, the diagnosis of HIV infection in people 50 years of age and over is increasing [10-15].

In Africa, the number of PLWHIVs aged 50 years and over has also increased since the use of HAART which has reduced morbidity and mortality. Initially, The Joint United Nations Programme on HIV/AIDS (UNAIDS) paid little attention to the 50+ age group. It was in 2006 that UNAIDS statistics began to take into account PLWHIVs over 49 years of age because a substantial proportion of PLWHIVs was part of this group. Studies carried out using Ugandan and South African data have shown an increase in the life expectancy of PLWHIVs [16,17]. Other studies have also mentioned the aging of the HIV epidemic in Africa, the comorbidities that can occur in PLWHIVs and the increase in life expectancy. This increase in the number of PLWHIVs will put a strain on the African health systems already weakened by the lack of means and qualified personnel for the care of the elderly [18-24]. There is hardly any data on the aging of the HIV epidemic in the DR Congo. Mandina, et al. have shown an association between hypovitaminosis D and aging in HIV/AIDS [25]. Collecting data relating to older PLWHIVs becomes urgent as their number is increasing and they have specific needs for their age group. Their physical, mental and social health needs must be understood by providers. The national AIDS and STI control program (PNLS) must develop and implement the health and social services required to take care of these patients.

The objective of this study is to compare the clinical and biological profiles of PLWHIVs aged 50 and over and those aged less than 50 years.

Methods

We carried out a cross-sectional study using a database of the service relating to a retrospective cohort. This study covers a period from January 1, 2008 to December 31, 2014. The

patients selected are those attending the infectious diseases service of KTUH. This is a consecutive series of PLWHIVs followed in outpatient and inpatient care who are at least 18 years old. Clinical and laboratory data from PWLHIVs aged less than 50 years were compared to those 50 years and over.

The following parameters of interest were analyzed:

- Sociodemographic characteristics [Age, gender (male, female, transgender), profession (unemployed, state workers, junior company officer, liberal and other), religion (Catholics, protestants, revival churches and other), civil status (married, single, widower, divorced), level of study [primary level (1 to 6 years), secondary (1 to 6 years) and university level (superior institute and university)], socioeconomic level (low, medium, elevated), ethnicity [[(Kongo and Ngala in West), Luba (in Center), and Swahili (in East)].

- The clinical [including opportunistic infections = OIs and other comorbidities (anaemia, Kaposi Diseases)] and biological characteristics of the study population. The diagnosis of oral candidiasis and shingles and genital herpes were clinical. Meningeal cryptococcosis was diagnosed by testing for a cryptococcus antigen, Indian ink and the detection of Cryptococcus neoformans by culture on sabouraud medium. For TB the diagnosis was made from the clinic, chest x-ray, sputum ziehl and genExpert. Non-specific bacterial pneumonia has been clinically diagnosed along with chest x-ray and clinical improvement under nonspecific antibiotic treatment.

- The vital issue (Alive, death, loss to follow).

- The evolution of CD4s$^+$ in relation to age.

- The biological characteristics of 2 categories of patients were evaluated. The analyzes carried out are shown in Table 1 and give the reference values of the various biological variables studied.

Table 1: Haematological and biochemical reference values.

N°	Variable	Reference values
1	Hb	12.5 to 15 g/dL for men and 10 to 15 g/dL for women
2	Ht	38% to 52% for men and 32% to 45% for women.
3	WBC	4,000 to less than 10,000 cells / mm³.
4	LF: Neutrophils	30% to 60%
	Lymphocytes	26% to 60%
	Eosinophils	0% to 12%.
5	CD4s$^+$	From 410 to 1590 cells/mm³
6	Urea	10 to 42 mg%.
7	Creatinine	0.5 to 1.2 mg%
8	ASAT	0 to 40 IU/L
9	ALAT	0 to 45 IU/L
10	High TC	When value > 200 mg/dL
11	Hypertriglyceridaemia	When TG > 150 mg/dL
12	High LDL-C	When value > 130 mg/dL
13	Low HDL-C	if value < 40 mg/dL for men and < 50 mg/dL for women

Hb: Haemoglobin; Ht: Haematocrit; WBC: White Blood Count; LF: Leucocyte Formula; CD4: Cluster of Differentiation four; ASAT: Aspartate Amino Tranferase; ALAT: Alanine Amino Transferase; TC: Total Cholesterol; LDL-C: Low Density Lipoprotein Cholesterol; HDL-C: High Density Lipoprotein Cholesterol

Statistical analyzes

The mean and standard deviation were calculated for continuous variables. For categorical variables, the frequency was calculated.

The comparisons were made using the means with Student's t- test and the proportions with the chi-square test.

Ethical clearance

The study is based on a retrospective cohort and used a de-identified database. The Helsinki ethical principles (respect for private life and confidentiality) were respected. This does not require informed consent and the opinion of an ethics committee.

Results

The frequency of PLHIVs aged 50 and over in this hospital population is 35.1%. The mean age ± SD of the patients was 45.7 ± 11.1 years in general. This mean age ± SD was 38.9 ± 6.9 in patients less than 50 years old and 58 ± 4.8 in those 50 years and older ($p < 0,01$) (Table 1A).

There is a predominance of the female sex (63% of

Table 1A: Sociodemographic characteristics.

Variables	All $n = 270$	< 50 ans $n = 175$	≥ 50 ans $n = 95$	p
Age ± SD	45,7 ± 11,1	38,9 ± 6,9	58,0 ± 4,8	< 0,001
Sex				< 0,001
Male	100 (37,0)	50 (28,6)	50 (52,6)	
Female	170 (63,0)	125 (71,4)	45 (47,4)	
Civil status				0,001
Maried	135 (52,9)	90 (54,5)	45 (50,0)	
Divorced	45 (17,6)	30 (18,2)	15 (16,7)	
Single	45(17,6)	35 (21,2)	10 (11,1)	
Widower	30 (11,8)	10 (6,1)	20 (22,2)	
Profession				< 0,001
Unemployed	95 (41,3)	80 (50,0)	15 (21,4)	
State worker	50 (21,7)	25 (15,6)	25 (35,7)	
Junior company officer	15 (6,5)	10 (6,3)	5 (7,1)	
Liberal	70 (30,4)	45 (28,1)	25 (35,7)	
Level of study				0,008
Primary	15 (9,4)	5(4,8)	10(18,2)	
Secondary	95 (59,4)	70 (66,7)	25 (45,5)	
University level	50 (31,3)	30 (28,6)	20 (36,4)	
Religion				0,056
Catholic	90 (46,2)	50 (38,5)	40 (61,5)	
Protestant	20 (10,3)	15 (11,5)	5 (7,7)	
Revival churches	55(28,2)	45(34,6)	10 (15,4)	
Other	30 (15,4)	20 (15,4)	10 (15,4)	
Socioeconomic level				0,016
Medium	90 (85,7)	60 (92,3)	30 (75,0)	
Low	15 (14,3)	5 (7,7)	10 (25,0)	
Ethnicity				0,005
Kongo	80 (39,0)	40 (30,8)	40 (53,3)	
Ngala	40 (19,5)	25 (19,2)	15 (20,0)	
Luba	60 (29,3)	45(34,6)	15 (20,0)	
Swahili	25 (12,2)	20 (15,4)	5 (6,7)	

SD: Standard Deviation

women). The sex ratio was 1,7 women to 1 man (1,7 F/1H). In the group of patients younger than 50 years, the frequency of women was significantly higher than that of 50 years and older (2,5 F/1 M).

The single people were predominantly under the age of 50 years. Those aged 50 years and over had a higher frequency of widowers.

PLWHVs aged 50 years and over were more in the primary study level. Most of them had a low socioeconomic level (*p* = 0.016). Patients under 50 years were more unemployed compared to those 50 years and over.

The clinical characteristics are shown in Table 2.

Patients over 50 years of age have been significantly classified as WHO stage 4. They had a high frequency of history of TB, genital herpes, hypertension, and tobacco use. On the other hand, those under 50 years of age had a significantly high frequency of shingles and hepatitis B-hepatitis C.

Regarding clinical signs on admission, patients 50 years of age and over had a high frequency of vomiting, hepatomegaly. Headaches were more common in patients younger than 50 years old. The means of SBP, DBP were significantly higher in patients 50 years and older.

The table 3 indicates the comorbidities.

Patients 50 years and over had a higher incidence of TB and anemia.

The biological characteristics are shown in the Table 4.

The mean Hb, HDL-C, and CD4s+ were significantly lower in patients 50 years and older. Urea, LDL-C, and ALAT levels were significantly higher in this category of patients.

CD4s+ count according to age

The figure 1 indicates the CD4s+ count according to age.

Below 200 CD4s+, the frequencies were similar between the 2 groups. For CD4s+ counts between 200 and 499 cells/μL,

Table 2: Clinical characteristics.

Variables	All n = 270	< 50 ans n = 175	≥ 50 ans n = 95	p
WHO Clinical Stage				< 0,001
Stage 1	27(10,0)	27(15,4)	0(0,0)	
Stage 2	33(12,2)	27(15,4)	6(6,3)	
Stage 3	83(30,7)	49(28,0)	34(35,8)	
Stage 4	127(47,0)	72(41,1)	55(57,9)	
Antecedents				
TB	60(22,2)	30(17,1)	30(31,6)	0,006
Bacterial pneumoniae	15(5,6)	15(8,6)	0(0,0)	-
Cerebral toxoplasmosis	5(1,9)	0(0,0)	5(5,3)	-
Meningeal cryptococcosis	20(7,4)	20(11,4)	0(0,0)	-
Kaposi disease	20(7,4)	15(8,6)	5(5,3)	0,231
Oral candidiasis	60(22,2)	45(25,7)	15(15,8)	0,067
Shingle	40(14,8)	35(20,0)	5(5,3)	0,001
Enteritis	10(3,7)	5(2,9)	5(5,3)	0,249
Genital herpes	15 (5,6)	5(2,9)	10(10,5)	0,011
Coinfection HBV-HCV	30(12,8)	25(16,7)	5(5,9)	0,012
HTA	40(14,8)	5(2,9)	35(36,8)	< 0,001
Diabetes mellitus	5(1,9)	0(0,0)	5(5,3)	-
Obesity	10(3,7)	5(2,9)	5(5,3)	0,249
Tobacco	20(7,4)	5(2,9)	15(15,8)	< 0,001
Alcohol	55(20,4)	40(22,9)	15(15,8)	0,110
Clinical signs on admission				
Fever	75(27,8)	45(25,7)	30(31,6)	0,188
Weight loss	125(46,3)	75(42,9)	50(52,6)	0,079
Diarrhea	240(88,9)	160(91,4)	80(84,2)	0,057
Cough	210(77,8)	140(80,0)	70(73,7)	0,150
Vomiting	235(87,0)	145(82,9)	90(94,7)	0,003
Headache	45(16,7)	40(22,9)	5(5,3)	<0,001
Conjunctival pallor	55(20,4)	35(20,0)	20(21,1)	0,478
Hepatomegaly	15(5,6)	5(2,9)	10(10,5)	0,011
Lateralization sign	10(3,7)	5(2,9)	5(5,3)	0,249
SBP	120,7 ± 18,2	118,9 ± 20,5	124,1 ± 1 2,5	0,025
DBP	77,8 ± 13,8	76,1 ± 15,7	80,9 ± 8,3	0,005
Weight	61,7 ± 15,7	60,7 ± 17,1	63,6 ± 12,1	0,213
Pulse	89,2 ± 18,1	93,5 ± 16,5	81,3 ± 18,1	0,000
Height	1,66 ± 0,09	1,69 ± 0,09	1,62 ± 0.06	0,000
RR	22,5 ± 4,9	22,4 ± 4,9	22,5 ± 4,9	0,924
BMI	23,5 ± 6,9	22,7 ± 8,0	24,9 ± 3,9	0,108

HTA: Hypertension; HBV: Hepatitis B Virus; HCV: Hepatitis C Virus; SBP: Systolic Blood Pressure; DBP: Diastolic Blood Pressure; RR: Respiratory Rate; BMI: Body Mass Index

Table 3: Comorbidities.

Comorbidities	All n = 270	< 50 ans n = 175	≥ 50 ans n = 95	p
TB	50(18,5)	20(11,4)	30(31,6)	< 0,001
Oral candidiasis	50(18,5)	30(17,1)	20(21,1)	0,264
Anaemia	65(24,1)	35(20,0)	30(31,6)	0,025
Shingle	20(7,4)	15(8,6)	5(5,3)	0,231
Meningeal cryptococcosis	15(5,6)	15(8,6)	0(0,0)	-
Cerebral toxoplasmosis	5(1,9)	0(0,0)	5(5,3)	-
Kaposi Disease	10(3,7)	10(5,7)	0(0,0)	-
Genital herpes	5(1,9)	0(0,0)	5(5,3)	-
Enteritis	5(1,9)	0(0,0)	5(5,3)	-

Table 4: Biological characteristics.

Variables	n	All	< 50 ans	≥ 50 ans	p
Hb	215	9,3 ± 2,9	9,7 ± 2,9	8,7 ± 2,7	0,013
Ht	160	29,4 ± 8,0	29,8 ± 7,5	28,6 ± 9,0	0,395
WBC	210	6339,5 ± 334,8	6301,7 ± 370,2	6423,8 ± 240,0	0,808
Neutrophils	200	59,3 ± 13,7	59,3 ± 12,6	59,3 ± 16,2	0,993
Lymphocytes	200	36,9 ± 13,3	36,5 ± 11,7	37,9 ± 16,4	0,484
Glycaemia	100	93,5 ± 21,1	91,8 ± 16,7	98,4 ± 30,7	0,179
Urea	205	31,6 ± 19,4	28,7 ± 15,8	38,6 ± 24,9	0,001
Creatinine	205	1,14 ± 0,16	1,07 ± 0,17	1,32 ± 0,75	0,122
Total Cholesterol	134	153,9 ± 53,9	156,7 ± 55,9	147,0 ± 48,9	0,346
LDL-C	115	79,9 ± 45,4	71,2 ± 41,9	99,6 ± 47,6	0,002
HDL-C	105	60,2 ± 42,7	70,2 ± 48,2	40,2 ± 15,5	0,001
Triglyceride	120	133,8 ± 61,6	137,7 ± 70,0	125,9 ± 39,8	0,326
ASAT	165	36,9 ± 33,8	34,8 ± 3,7	42,4 ± 2,5	0,200
ALAT	165	33,6 ± 25,8	28,9 ± 22,6	46,0 ± 29,7	0,000
CD4s+	270	256,9 ± 23,5	290,4 ± 27,3	195,4 ± 12,1	0,001

Hb: Haemoglobin; Ht: Haematocrit; WBC: White Blood Cells; LDL-C: Low Density Lipoprotein Cholesterol; HDL-C: High Density Lipoprotein Cholesterol; ASAT: Aspartate Amino Transferase; ALAT: Alanine Amino Transferase. CD4: Cluster of Differentiation. The mean Hb, HDL-C, and CD4s+ were significantly lower in patients 50 years and older. Urea, LDL-C, and ALAT levels were significantly higher in this category of patients.

the most common category of patients was 50 years and over. No cases have been observed in people 50 years and over with 500 CD4s+ and above.

Vital outcome of patients

Vital outcome of patients is shown in figure 2.

There are more survivors among those under 50, but the difference is not statistically significant.

Discussion

This study compared the clinical and biological characteristics of PLWHIVs aged 50 years and over with those under 50 years.

This study shows that more than one in three PLWHIV was aged 50 and over in this hospital series. The average age of PLWHIVs aged 50 and over was high. There were more widowers, people with a primary education and a low socio-economic level for PLWHIVs aged 50 years and over.

There was a predominance of women in the general study population and in patients under 50 years of age.

There are more widowers, people with primary education and a low socioeconomic level for PLWHIVs aged 50 and over. There was a predominance of females in the study population in general and in patients under 50 years of age.

TB and hypertension were frequently encountered in the history of PLWHIVs while the history of hepatitis B and C was

Figure 1: CD4s+ count according to age.

Figure 2: Vital outcome of patients.

more noted in patients under 50 years of age. The greater number of WHO stage 4 patients are found in this group of patients as well as high average of DBP. TB and anemia were common in this category of patients. Their average levels of Hb, HDL-C, and CD4s+ were low. On the other hand, high values of urea, LDL-c and ALAT were observed.

Fréquency of PLWHIVs, sociodemographic and economic characteristics

The frequency of PLWHIVs aged 50 and over in this study was 35.1% of all PLWHIVs. If we exclude the deceased and the lost to follow-up, with the use of HAART, this number will increase more and more and will pose problems related to the advancement in age and the geriatric syndrome. Despite the limited number of patients in this series, this statistic gives a trend in the aging of the epidemic in our context. This increasing trend in the number of PLWHIVs aged 50 and over with HIV infection shows that it is not only sexually active young people and young adults who become infected. From the age of 50, some people are still sexually active. This group of people can be exposed to the risk of infection with HIV if they do not follow the prevention recommendations of the national AIDS and STI control program. We also observe an improvement in the quality of life and survival of PLWHIVs since the use of HAART. This explains this increase in the number of PLWHIVs who are at least 50 years old.

In general, the proportion of PLWHIVs is increasing in the world. Statistics relating to the aging of the epidemic vary in the literature. In 2014, in the gap report, UNAIDS estimated the elderly PLWHIVs at 4.2 million [26]. This proportion was estimated globally at 5.7 million in 2016; 80% of these PLWHIVs lived in low- or intermediate- resource countries [7]. This trend was expected to continue, particularly in low- or intermediate- resource countries, during the year 2020. CDC statistics show that in 2018, PLWVIHs accounted for 17% of new reported HIV-infections. Among the PLWHIVs in the USA and their dependents, one in 6 PLWHIVs was aged 50 and over [1,3]. Currently, in the USA this proportion is nearly 50% of newly diagnosed PLWHIVs. Batha, et al. [6] found in a systematic review and meta-analysis of 28 studies 15.79% of pooled prevalence of HIV in elderly. In Canada, in 2018, the number of older PLWHIVs was 22.5% of diagnosed with HIV infection [27]. It is estimated that in Canada, by 2025, one in six infected adults will be 50 years of age and over [12]. In the UK, statistics from 2018 show that one in five people have been diagnosed late with HIV infection. And two in five accessed HIV care when they were 50 or older [28].

African studies have also shown that the life expectancy of PLWHIVs has increased in South Africa, Uganda, Rwanda and is approaching that of people not infected with HIV. The number of PLWHIVs in Sub-Saharan Africa triples in the coming years to reach 10 million by 2040 [16,17,23,30]. In 2015, in Rwanda, the study population of Nsanzimana, et al.
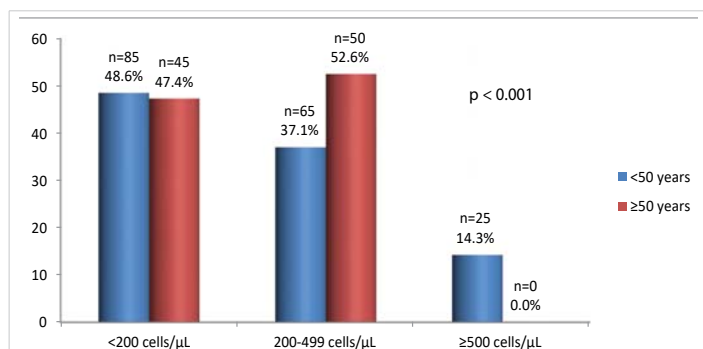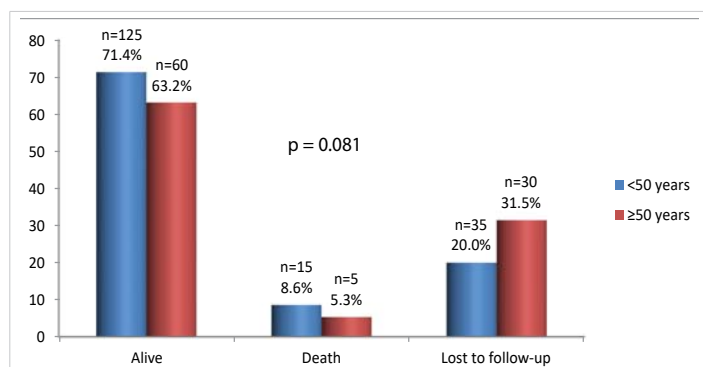
included 10.4% of PLWHIVs aged 50 and over [30]. Taylor, et al. in Ghana, in 2018, had 20% of PLWHIVs over the age of 50 [31]. In the series by Diallo, et al. the proportion of older PLWHIVs was 10.3% [33]. It's the same in Asia: in Madi, et al. in India, the proportion of PLWHIVs was 15.27% [34].

Mean age ± SD of older PLWHIVs in our series was 58.4 ± 4.8 years. This average age is high and shows that the life expectancy of PLWHIVs is increasing.The median age of PLWHIVs in the series by Diallo, et al. was 54.5 years (IQR: 52-57.4), in the elderly people [33]. The mean age ± SD in the work of Madi, et al. was 55.9 ± 6.1 years [34]. In Nigeria, Dakum, et al. had a median age of 51.1 years (IQR: 52-60) [35]. Age is considered to be an indicator of the clinical progression of HIV infection [6]. It is an independent prognostic factor influencing the progression of the disease. When the diagnosis is made from the age of 50, life expectancy is reduced. Seroconversion in old age lowers the endurance rate, increases mortality and the rapid development of AIDS [6]. Advanced age makes PLWHIVs and the elderly uninfected with HIV susceptible to numerous pathogens and vulnerable to infectious and non-infectious diseases (cardiovascular pathologies, hypertension, diabetes mellitus). This impacts the adherence to HAART, which drops.

In this series, the female sex is more represented among PLWHIVs under 50, with a statistically significant difference. Probably after 50 years more of them die or be lost to follow-up. Women are vulnerable to HIV infection. Their vulnerability is physiological, economic, etc. In the USA, in 2018, people newly diagnosed with HIV were predominantly female [3]. In Nsanzimana, et al. women represented 63.8% overall [30]. The percentage of women aged 50 and over has not been determined. For Durvasula, the prevalence and incidence of HIV infection in older women will increase as the number of PLWHIVs increase [32]. The sex-ratio (Male/female) in Diallo's series [33] was 1,2. Madi's PLWHIVs series included 68.4% of men [34]. In the study by Dakum, the female sex represented 53% [35].

Widowers were more numerous among older PLWHIVs. Patients in this series were included when scaling up was not yet effective. Elderly people who are frail and probably have more comorbidities are more prone to die. This may explain the high number of widowers in this socio-demographic category of patients.

Singles were more numerous among patients under the age of 50. Generally, in society, married couples are more numerous among adults. From the age of 50, it is more likely to meet the bride and groom in the communities. In Rwanda, married or living with partners represented 47.9% while divorced and single people represented 22.3% and 11.1% respectively [30]. The proportions of married people differ depending on the series: 59.6% for Diallo, et al. [33] and 92.5% for Madi, et al. [34]. In the series by Dakum, et al. married

people represented 71%, widowers, separated couples and divorced 24% [35].

In this study, the level of primary education was predominant in older PLWHIVs. In Diallo, et al. illiterate represented 57.6%. The Dakum, et al. [35] series had enrolled 33% of secondary level PLWHIVs followed by 29% of primary level patients, 19% of post-secondary level PLWHIVs; 19% of the study population consisted of illiterate people.

The most frequent socioeconomic level of patients in this study was low. The study population is a hospital population. It is difficult to draw a conclusion on these aspects relating to the socioeconomic level. People without a job are found the most frequent among those under 50 in this series. It is among young people and young adults that one usually finds the unemployed and the self-employed who organize their own activities. Among those over 50, we often find people with a job. In the Diallo's study [33], 57% of patients had a professional occupation and 64.17% of patients in the Madi, et al. series were employed.

Christians, especially Catholics, are more numerous in our series. This corresponds to the distribution of church members in the DR Congo where Catholics are more numerous [36].

Clinical characteristics

Overall, the PLWHIVs in this series were classified as stages 3 and 4. These are probably patients who were diagnosed late or who went through other health structures. It is not uncommon to meet PLWHIVs who opt for treatment with traditional healers or who are content only with spiritual care. They ultimately consult late in modern medicine when their health deteriorates significantly due to advanced HIV infection. However, advanced HIV infection has a poor prognosis. It is in these medical conditions that appear the TB or meningeal cryptococcosis responsible for death in many PLWHIVs. In the general population, many people do not know their HIV status. They are seroignorant. Even when they have been at risk of contracting HIV, they refuse to be tested for HIV. Which delays care.

The group of older PLWHIVs included more WHO stage 4 patients. Which means they're probably taken care of late. During aging, immunity deteriorates. This can make an elderly person infected with HIV more vulnerable, especially when they refuse the care of modern medicine and if they are cured by traditional medicine or only by "prayer".

Age is an indicator of disease progression and age 50 and over is an independent prognostic factor influencing death. In Nsanzimana, et al. stages 1 and 2 accounted for 54.7% [30]. Stage 4 was poorly represented. The study by Diallo, et al. [33] included 59.2% of patients classified as WHO clinical stages 3 and 4. The series by Madi, et al. [34] and Dakum, et al. [35] predominated in WHO clinical stage I. These proportions represented 64.17% of patients and 47% respectively.

TB has been frequently encountered in the history of pateints in our series, especially in PLWHIVs aged 50 and over. Given the mutual effects of these two pathologies, it is important to look for TB in PLWHIVs and HIV infection in tuberculosis patients. This requires the establishment of a circuit of care for PLWHIVs that takes these two conditions into account. Hence, the importance of setting up a care system that provides a full range of care (one-stop shop). In healthcare structures where the two conditions are treated in different departments, close collaboration must be established between the departments in which the patients are treated.

A history of hypertension was reported by many of the PLWHIVs in this study. Healthcare providers should look for it in any PLWHIV. HIV infection is characterized by chronic systemic inflammation and intense immune activation. This inflammation affects various organs of the body and exacerbates other comorbidities including cardiovascular disease. HIV infection also accelerates atherosclerosis. Hence, the possible increase in cardiovascular risk.

Different symptoms and signs have been encountered in our patients. They are classic and common to many PLWHIVs. Very few of them were statistically significant. These include vomiting, increased DBP in PLWHIVs aged 50 and over, and headaches in PLWHIVs under 50. The management of these patients must take particular account of the blood pressure disturbances that may be observed during HIV infection.

Comorbidities

In this study, TB, anemia and hypertension were the co-morbidities that were statistically significant. As stated in the section on medical history, HIV-TB coinfection should be tested for every healthcare provider-patient encounter. TB is a leading cause of death in PLWHIVs worldwide [37,38]. It is important to screen for pathologies occurring in people of advanced age in PLWHIVs. TB represented 17% in Rwanda in 2015 [30] and 26,67% at Madi series [34].

Anemia, usually multifactorial in PLWHIVs, must be addressed and corrected. Among PLWHIVs, anaemia is common [39,40].

As for hypertension, it must be screened for. Non-pharmacological and pharmacological measures must be put in place. The mean of DBP is significantly higher in older PLWHIVs in our series. SBP was also elevated in PWLHIVs 50 years and older, but this elevation in blood pressure was not statistically significant. Cardiovascular and metabolic pathologies appear in the elderly. With age, cardiovascular pathologies including hypertension appear in elderly people [1,9,15,23]. In the series by Diallo, et al. and Dakum, et al. hypertension represented 31.7% and 21% of patients, respectively. At Madi, et al. hypertension was encountered in 77.5% of cases [34].

All these comorbidities must be monitored in collaboration with the various expertise in the various fields.

Patients under 50 had a higher frequency of shingles and viral hepatitis B and C. We have not found an explanation justifying the high frequency of these pathologies in young people.

Biological charactéristics

In this series, the means of Hb, HDL-C and CD4s$^+$ were significantly low in older PLWHIVs. Anemia is common in HIV infection as we mentioned above. It is of multifactorial origin. It gets worse as the HIV infection progresses. Anemia is responsible for morbidity and mortality in PLWHIVs. However, it can be treated. It is therefore recommended that healthcare providers always obtain an Hb level as soon as the PLWHIVs are enrolled in the healthcare structure. In DR Congo, the blood count is classified in the basic examinations to be carried out at PLWHIVs.

Low HDL-C in older PLWHIHs means that HIV infection is progressing and the risk of inheriting is increasing. This risk increases with age. In our series, the low HDL-C level in PLWHIVs aged 50 and over is statistically significant. This category of patients is already at risk due to advanced age and HIV infection. Usually they have a high viral load and a low CD4s$^+$ count. These patients are at risk of atherosclerosis and cardiovascular pathologies. The lipid profile must therefore be included in the pre-treatment assessment in settings where this examination may be available or if the patient can perform it.

The low CD4s$^+$ count indicates late-stage HIV infection and late management. When the CD4s$^+$ counts were 200/μL, there was no difference between the two groups of patients. Between 200 and 499 CD4s$^+$/μL, the number of PLWHIVs was higher in PLWHIVs aged 50 and over and the difference was statistically significant. In Nsanzimana, et al. in Rwanda, the CD4s$^+$ count was less than 200 CD4s$^+$/μL in 23.3%; 38.3% of PLWHIVs had a CD4s$^+$ count between 200 and 499 CD4s$^+$/μL. These results have been presented globally and do not distinguish between the under 50 and 50 and over categories [30].

In patients 50 years and older, urea, LDL-C, and ALAT levels were significantly higher. For renal function, it will be necessary to complete the creatinine dose balance and calculate the glomerular filtration rate. Other explorations must be carried out in collaboration with the nephrology team including the urine dipstick, renal biopsy etc. This is because kidney function usually impaired in HIV infection and at an advanced stage of the disease, especially in patients who are naive to HAART, due to the HIV *per se* or the drugs used to treat opportunistic infections (IOs). HAART has also been implicated for certain drugs used in combination therapy.

In HIV-related dyslipidemias, LDL-C abnormalities have

been described. Its values can be high and participate in the occurrence of atherosclerosis responsible for cardiovascular disease. In HIV-related dyslipidemias, LDL-C abnormalities have been described. Its values can be high and participate in the occurrence of atherosclerosis responsible for cardiovascular disease. In our series, it occurs particularly in PLWHIVs aged 50 and over. Due to their age, these patients are at risk of developing cardiovascular disease.

In HIV infection, liver damage can occur. PLWHIVs can present with viral hepatitis B or C. OIs and drugs used during HIV infection can also be the basis of liver damage. This may explain the disruption of transaminases.

These various modifications require additional studies with a larger study population.

Survival of PLWHIVs was greater in patients less than 50 years old. However, this difference was not statistically significant. In a meta-analysis, Pooralajal, et al. study AIDS survival rate and mortality among PLWHIVs. This team finds that the majority of HAART-naive patients die within 2 years of the onset of AIDS [42].

Conclusion

The aging trend of PLWHIVs can be seen in this study by their high average age.

The female sex predominates in the category of PLWHIVs under 50 years old.

The patients included in this study were predominantly in WHO stages 3 and 4. Those aged 50 and over were the largest number in stage 4.

TB and hypertension were the most common medical history among 50-year-old PLWHIVs.

dparticularly in PLWHIVs 50 years of age and older. The biological disturbances concerned Hb, HDL-C, LDL-C, urea, ALAT and CD4s+.

Perspectives

This study leads to prospects including those of setting up a unit for the management of medical conditions (clinical and biological) specific to PLWHIVs aged 50 and over. It should be run by a multidisciplinary team trained in geriatrics and HIV (infectiologists, psychologists, psychiatrists, cardiologists, sociologists, medical doctors, pharmacists, nurses, oncologists, pharmacologists) and other experts specializing in chronic diseases occurring during aging. This team will be responsible for managing the health conditions associated with the early aging observed during HIV infection: changes in physical appearance, cognitive abilities and increased vulnerability to stress.

This will require the training of identified providers in geriatric care, taking into account physical and mental health.

Those selected must be trained in research (Epidemiology, research methodology and holistic care of elderly PLWHIVs). The specific needs of PLWHIVs aged 50 and over in our community should be identified.

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