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Research Article

Profiles of Elderly People Infected with HIV and Response to Antiretroviral Treatment in Burkina Faso: A Retrospective Cohort Study

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Abstract

Background: In sub-Saharan Africa, few studies exist on elderly HIV-positive populations. We aimed to examine the profiles of elderly PLHIV in Burkina Faso and their response to ART. Methods:We reviewed the monitoring and treatment of PLHIV over the age of 50, and then compared them to monitoring and treatment of PLHIV under 50.

Results: Three thousand three hundred and sixty-seven patients were included. The median age was 54.5 years in elderly people, and 34.9 years in young people (P=0.03). Screening was performed following clinical suspicion in the two groups (64.9% in elderly vs 56% in young people), (p<0.001). Cardiovascular risk factors were generally more significant in elderly people. The risk of death on ART was 2.3 times higher in elderly (p<0.001).

Conclusion: HIV infection in older people occurs on patients that have already some cardiovascular risk factors. A particular attention should be given to multidisciplinary care for the elderly.

Keywords:

HIV; Elderly; ART; Bobo-Dioulasso; Burkina faso

Introduction

Since the introduction of antiretroviral treatment (ART) for people living with Human Immunodeficiency Virus (PLHIV), the mortality rate related to HIV infection has decreased dramatically [1]. As a result, the life expectancy for PLHIV has increased, and in both developing and developed countries, the HIV-positive population is aging [2].

According to the World Health Organization (WHO), an HIV-positive person is considered to be "elderly" when s/he is at least 50 years of age or older [1]. While the HIV pandemic primarily affects young adults aged 15 to 49 years, elderly people are concerned as well. In the United States, 11 percent of all reported cases of Acquired Immune Deficiency Syndrome (AIDS), the syndrome which is caused by HIV, were in people over the age of 50 [3]. In France, 23 percent of cases of HIV in French hospital databases are in patients over 50 years of age. They represent 18 percent of newly-diagnosed cased of HIV [4].

In sub-Saharan Africa, few studies exist on elderly HIV-positive populations [5, 6]. In Burkina Faso, 14,000 (16 percent) of people over the age of 50 were living with HIV in 2011 [7]. No previous studies have examined the profiles of elderly people and importance of age in HIV cohort treatments in Burkina

Faso. Furthermore, the consequences of HIV infection on the response to ART before and after 50 years of age have never been studied.

The objective of this study is to examine the profiles of elderly PLHIV in Burkina Faso and their response to ART.

Patients and Methods

We carried out a retrospective cohort study. To be included in the study, participants had to be 50 years or older. We reviewed the monitoring and treatment of PLHIV over the age of 50, and then compared them to monitoring and treatment of PLHIV under 50.

The study was carried out between January 2007 and December 2011 at the hospital day clinic at the Souro Sanou University Hospital (CHUSS) in Bobo-Dioulasso, Burkina Faso's second city. About 6,792 people were being monitored at CHUSS at the time of the study.

Patients were enrolled in the therapeutic cohort at the clinic based on the following criteria:

- Be at least 15 years of age;
- Test HIV-positive, based on the diagnostic algorithm in place in Burkina Faso; and
- Visit the day clinic at CHUSS for the first time during the period of the study.

To complete our retrospective cohort, we extracted variable from the computerized database at the day clinic. We selected socio-demographic, temporal, clinical and biological variables, as well as those concerning patient's therapy and monitoring. Criteria outlined by WHO for beginning ART were used [1]. Similarly, WHO criteria were used for the introduction of cotrimoxazole as a prophylaxis; the prophylaxis was recommended, in the absence of contraindication, for patients with CD4≤350 cells/mm^3, or Stage 2, 3 or 4 HIV infection, based on WHO criteria.

The data was analyzed using Epi info 3.5.1. andMedCalc 11.2.0.0 software. The characteristics of the study population were described by number, proportion ranged by confidence intervals for qualitative variables, means, standard deviations and interquartile ranges (IQR) for quantitative variables. The proportions were compared using a Pearson's chi-square test or a Fisher exact test, when that was more appropriate. The Student t-test was used to test equality of two means from independent samples; when conditions for application were not met, the Mann-Whitney non-parametric test or the Kruskall-Wallis test was used. Immunological efficiency (increase in CD4 + lymphocytes at more than 500 cells / mm^3) and virology (detectability of viral load) were estimated at 6, 12, 24 and 48 months of ART. Survival at 6, 12, 24 and 48 months was examined using the Kaplan-Meier method. The survival curves of elderly and young people were compared using the Logrank test. A value of $p \leq 0.05$ was used the threshold for statistically significant differences.

Ethicconsiderations

Ethical norms and national legislation were respected during the course of the study. We obtained research authorization from hospital officials. We ensured anonymity of participating patients and confidentiality of data used in the study.

Results

Profiles of elderly people infectedwith HIV

Socio-demographic and anthropometric characteristics

Three thousand three hundred and sixty-seven patients were included in the study. The median age for the HIV screening was 54.5 years (IQR [52-57.4]) in elderly people, and 34.9 years (IQR [29.6-40.9 years]) in young people (P=0.03). The sex ration (M/F) was 1.2 in elderly PLHIV and 0.4 in young PLHIV (p<0.001). N : number.

Screening was performed following clinical suspicion in the two groups (64.9% in elderly people compared to 56% in young people), (p<0.001). HIV-1 was more common (90.9%) in both groups. Median body-mass index (BMI) was 19.8 kg/m² in elderly people and 20.5 kg/m² in young people (p=0.03). Cardiovascular risk factors were generally more significant in elderly people than in young people: arterial hypertension (36.2% compared to 13.2%, p=0.001), hyperglycemia (7.2% compared to 5.4%, p=0.36), hypercholesterolemia (10.4% compared to 7.6%, p=0.53), hypertriglyceridemia (18.3% compared to 16%, p<0.001). Hyper-creatininemia was more common among elderly patients (7.1% compared to 3.3%, p=0.02). More than half of both elderly (59.2%) and young patients (53.1%) were at an advanced stage of infection at the time of its discovery (p=0,003).

Clinical and biological characteristics at ART initiation

Two thousand five hundred seventy-two (76.4%) patients in the study began ART: 265 elderly PLHIV and 2,307 young people.

The median CD4 level was 174 cells/µL in elderly people, compared to 178 cells/µL in young people. The CD4 level was less than 350 cells/µL in 97.1% of elderly PLHIV and 89.6% in young PLHIV (p=0.001).

The median time of ART initiation was 31 days IQR [18-84] and 41 days IQR [21-166] for elderly and young PLHIV, respectively (p=0.025).

The use of frontline IP was more common in elderly PLHIV than young PLHIV (19.6% compared to 13.7%), (p<0.001).

Response to ART in elderly people infected by HIV

Under ART, the median rate of CD4 progression was 154 and 158 cells/µL in elderly PLHIV and young PLHIV,

	Elderly patients n(%)	Young patients n(%)	Total	Probability
Couples				
Yes	158(59,6)	1228(53.2)	1386(53.9)	**0.028**
No	107 (40.4)	1079 (46.8)	1186 (46.1)	
Number	265	2307	2572	
Gender				
Male	139(52.5)	621(26.9)	760 (29.5)	**<0.001**
Female	126 (47.5)	1686(73.1)	1812 (70.5)	
Number	265	2307	2572	
Illiterate				
Yes	152(57.6)	1039(45.1)	1191(46.4)	**<0.001**
No	112 (42.4)	1264(54.9)	1376 (53.6)	
Number	264	2303	2567	
Professional Occupation				
Yes	151(57)	890(38.6)	1041(40.5)	**<0.001**
No	114(43)	1417(61.4)	1531(59.5	
Number	265	2307	2572	
Urban resident				
Yes	241 (90.9)	2100 (91)	2341 (91)	**0.95**
No	24 (9.1)	207 (9)	231(9)	
Number	265	2307	2572	

Table 1: Sociodemographic characteristics at ART initiation.

Protocols	Schema with	Elderly patients n (%)	Young patients n (%)	Total	P
	NVP	66 (24.9)	1108(48)	1174(45.6)	
2 INTI + 1 INNTI	EFV	147(55.5)	878(38.1)	1025(39.9)	
	LPV	49(18.5)	296(12.8)	345(13.4)	
2 INTI + 1 IP	IDV	3(1.1)	21(0.9)	24 (0.9)	**<0.001**
3 INTI	3TC+D4T+ABC	0	2(0.1)	2(0.1)	
	3TC+AZT+ABC	0	2(0.1)	2(0.1)	
Total		265	2307	2572	

P: probability; NRTI: nucleoside reverse transcriptase inhibitor (NRTI); NNRTI: non-nucleoside-reverse transcriptase inhibitor; PI: protease inhibitor. NVP: nevirapine; EFV: efavirenz; LPV: lopinavir; IDV: indinavir; 3TC: lamividine; d4T: stavudine; ABC: abacavir; AZT: zidovidine.

Table 3: Initial therapeutic protocols and schemas.

respectively. After 24 weeks (6 months), 95.5% (109/113) of elderly patients and 96.2% (1,101/1,144) of young patients had an undetectable viral load (p=0.23). The median time for confirming an undetectable viral load was 23 and 24 months in elderly and young patients.

Under ART, cardiovascular risk factors, such as arterial hypertension, hypertriglyceridemia and hyper-creatininemia were significantly more frequent in elderly patients than young.

Discussion

Elderly people represented 10.3% (346/3,367) of new patients in our cohort. This frequency is variable throughout the world (11.4% in sub-Saharan Africa, 9.9% in Europe, 15% in the United States, 27% in North America in similar cohorts [8-10]. The low rate of screening in elderly people and the short evolution time of their illness led to an underestimation of infection in the therapeutic cohort. Behavioral risk factors and lack of targeted HIV prevention campaigns for people over the age of 49 could have led to the increase in HIV infection in elderly people [11]. The absence of epidemiological monitoring of HIV infections in people over the age of 49 partially explains the lack of data and consideration in HIV response.

The median age for screening for elderly patients was 54.5 and 34.9 for young patients (p<0,001). More males were

	Elderly patients n (%)	Young patients n (%)	Total	P
HIV Serotype				
HIV1	221(83.4)	2145(93)	2366(92)	
HIV2	20(7.5)	36(1.6)	56(2.2)	**<0.001**
HIV1+2	24(9.1)	126(5.4)	150(5.8)	
Number	265	2307	2572	
BMI				
Median [IQL]	19.8[17.6-22.6]	20.5[18.2-23.2]	20.4[18.1-23.6]	**0.03**
<18.5	80 (33.2)	575(28.3)	655(28.9)	**0.068**
<20	126(52.3)	895(44)	1021(45)	**0.009**
>20	115 (47.7)	1134 (56)	1249 (55)	
Number	241	2029	2270	
High AH	79 (31.7)	271(12.5)	525(20.7)	**<0.001**
Number	249	2166	2532	
WHO 3 / 4	157 (59.2)	1205 (53.1)	1362(53.7)	**0.003**
Number	265	2269	2534	
CD4 Rate (cell/µL)				
Median	174[99-244]	178[86-271]	178[88-267]	**0.3**
CD4<200	141(59.2)	1134 (56.2)	1275(56.5)	**0.2**
CD4 <350	231(97.1)	1808 (89.6)	2039(90.4)	**<0.001**
Number	238	2255	2493	
Hypercreatininemia	18 (6.9)	81 (3.7)	99(4)	**0.016**
Number	259	2218	2477	
Hyperglycemia	24 (9.3)	165(7.5)	189(7.7)	**0.36**
Number	258	2202	2460	
Hypercholesterolemia	21 (11.4)	153 (9.6)	174 (9.8)	**0.53**
Number	184	1587	1771	
Hypertriglyceridemia	31 (36.9)	302 (17.4)	333 (18.3)	**<0.001**
Number	184	1640	1824	
P: probability, BMI: body mass index; AH: arterial hypertension; WHO: World Health Organization				

Table 2: Prevalence of clinical and biological anomalies at ART initiation.

screened than females (p<0,001). In Africa, HIV screening tends to be predominantly females in groups under the age of 50, though results are different between authors and countries [9, 12, 13]. Higher age at the time of screening seems to be a risk factor for morbidity and mortality [9]. The higher proportion of males after the age of 40 could be linked to a higher probability of late diagnosis or sexual activity, a risk factor for HIV infection [7, 14]. In our series, elderly people were more likely to be illiterate (61.7% compared to. 46%, p<0,001), have professional careers (57.9%, compared to 37.8%, p<0,001) and reside in urban areas (91.4% compared to 87.9%, p=0.05). Orchi et al. in Italy also observed the same trends regarding education level and professional activity [15].

One hundred and eighty-four elderly patients, or 54.6%, were at WHO stage 3 infection, compared to 50% of young patients. The difference was not statistically significant (p=0.12). For patients in the study, screening was most often done at an advanced stage of infection [8, 16-18].

HIV-1 was the predominant serotype. Infection by HIV-2 and by HIV-1 and -2 was found in 3.1% and 5.9% of patients, respectively. HIV-2 infection was more frequent in elderly patients than young (p<0.001).

Elderly people (54.6%) and young people (50%) were more symptomatic (WHO stage 3 and 4) at the time of discovery of the infection (p=0.12). In Africa, patients are generally diagnosed at an advanced stage of the illness [16-18]. Some authors reports a significantly higher prevalence of WHO stage 4 infection among elderly people than young people [19, 20].

In our cohort, the rate of CD4 lymphocytes at screening was low, regardless of age at the time of screening: 185 [99-314] cells/µL in elderly PLHIV and 205 [90-357] cells/µL in young PLHIV (p=0.36). Our results are different from some cohorts in the North, with a significant different in CD4 between elderly people (low) and young (higher) [10, 21, 22]. The late diagnosis in the study could be the main cause.

Arterial hypertension, hyper-creatininemia and hypertriglyceridemia were the biggest risk factors in our patients at the initial examination. During the course of the study, in addition to cardiovascular risk factors cited, rate of hyperglycemia

	Elderly patients	Young patients	Total	RR	Log Rank test p
High AH*					
Incidence n (% p.a.)	51(39.2)	389(30.6)	440(31.4)		
Person at risk n (p.a.)	127(130.3)	1645(1270.2)	1772(1400.5)	2.1[1.4-3.1]	**<0.001**
AIDS					
Incidence n (% p.a.)	742(22.2)	635(18)	709(18.3)		
Person at risk n (p.a.)	13 (332.7)	2066(3537.3)	2279(3870)	1.2 [0.9-1.5]	0.18
Hyper-creatininemia					
Incidence n (% p.a.)	9(2.2)	32 (0.7)	41(0.8)		
Person at risk n (p.a.)	193(414.6)	1946(4437.3)	2139 (4851.9)	3 [1-8.9]	**0.002**
Hyperglycemia	53(17)	319 (8.6)	372(9.2)		
Incidence n (% p.a.)	184 (311.5)	1850 (3729.8)	2034(4041.3)	2[1.4-2.9]	**<0.001**
Person at risk n (p.a.)					
Hypercholesterolemia	57 (21.8)	462 (15.9)	519 (16.3)		
Incidence n (% p.a.)	135 (261.2)	1336(2913.7)	1471 (3175)	1.4[1-1.9]	**0.026**
Person at risk n (p.a.)					
Hypertriglyceridemia	35 (12)	299 (10.2)	334 (10.4)		
Incidence n (% p.a.)	130 (293.3)	1274(2932.3)	1404(3225.6)	1.2[0.8-1.7]	**0.4**
Person at risk n (p.a.)					
Loss of sight	34 (9.9)	259 (5.2)	293 (5.3)	1.3[0.9-1.9]	**0.1**
Incidence n (% p.a.)	265(493.1)	2307(5020)	2572(5512.8)		
Person at risk n (p.a.)					
Death	56 (11.4)	239 (4.8)	295 (5.5)		
Incidence n (% p.a.)	265 (493.1)	2307(5020)	2572 (5513.1)	2.3[1.5-3.3]	**<0.001**
Person at risk n (p.a.)					

* Arterial Hypertension

Table 4: Incidence of clinical and biological events under ART.

Two hundred and ninety-five -11.4%) deaths under ART were recorded (295/2,572), including 56 elderly patients (56/265, or 21%) and 239 young patients (239/2,307, or 10.3%), (p=0.001).

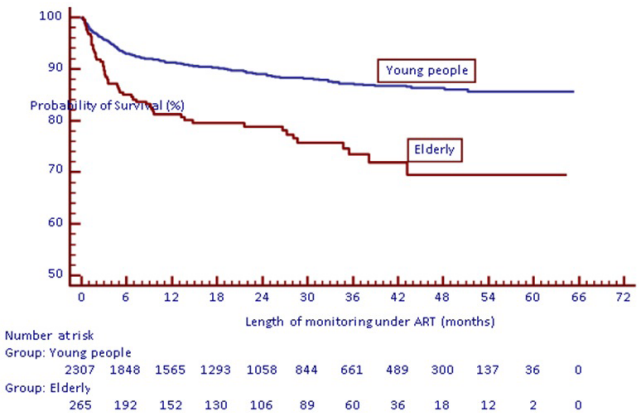

Figure 1: Survival curve under ART.

was higher in elderly people than young (p<0,0001).Literature corroborates this observation: the frequency of cardiovascular risk factors (arterial hypertension, hyperglycemia, hypercholesterolemia, hypertriglyceridemia) is higher in HIV-positive patients [23-29].

During the course of the study, the increase in the incidence of certain factors such as hyper-creatininemia in elderly patients under ART could be linked to the use of Tenofovir or traditional medicine [30].

A median increase in CD4 lymphocytes was observed at 12 months in elderly PLHIV, compared to at 6 months in young people. A similar immunological progression was observed by other authors [13]. According to Chêne et al., the late immunological reconstitution after six months of treatment in PLHIV would have a more important negative prognostic value at initiation than CD4 rate [21].

For those under ART, the risk of death was 2.3 (1.52-3.32) times higher in elderly patients than in young. Patient death was most frequent in the first six months of ART. The mortality in Collins et al. cohort was 2.7 (1.8-4.08) times higher in elderly patients than young, after adjusting for confusion factors [13]. BMI < 18 kg/m^2, WHO stage 3 infection or C from CDC,CD4rate < 200, hemoglobin rate < 10 g/dl and viral load > 5 $\log_{10}$ are all factors associated with early death under ART. Age at time of screening greater or equal to 50 years was also a predictive factor of early death under ART [16-18].

Conclusion

HIV infection in elderly patients is a reality. It exists alongside cardiovascular risk factors, which become more frequent

after infection. Late screening, advanced stage of infection at the time of screening and inadequate immune response often decrease the long term prognosis.

These results could have important implications in the management of HIV infection in elderly patients, who should be targeted by appropriate public health interventions, such as screening and information about HIV, prevention of risk behaviors and acquisition and progression of HIV infection. Particular attention should be paid to multidisciplinary treatment of elderly PLHIV.

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