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Survival of Antiretroviral Therapy Patients at the Outpatient Treatment Centre of the Community University Hospital of Bangui from 2015 to 2020

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Abstract

Background: The advent of antiretroviral treatment has considerably increased the life expectancy of people living with HIV in recent years. The Central African Republic, despite challenges related to the socio-political context, is committed to achieving the UNAIDS 90-90-90 targets and to the elimination of AIDS by 2030 advocated by the WHO. **Objective:** To analyze survival among HIV-positive adult patients on antiretroviral therapy from 2015 to 2020. **Methods:** This was a history-based cohort study of patients started on ART. The main variable was survival. The Kaplan-Meier method was used to describe the survival curve since inclusion in the cohort and a multivariate Cox model was used to investigate factors associated with mortality on ART. **Results:** A total of 145 naive patients started ART at the Outpatient Treatment Centre (OTC) in 2015. A female predominance was observed in our study with 78.08% of cases. The analysis of the patients' fate at the time of point of treatment showed that 58.62% of them were still in active care and 13.10% died. The probability of survival at 5 years was 0.82 and mortality was significantly associated with very advanced disease (WHO stage IV) ($p = 0.047$) and anemia ($p = 0.039$). **Conclusion:** The majority of patients were still in care at the endpoint and mortality was significantly related to advanced disease and anemia. Early management of people living with HIV combined with better quality of care would improve their survival.

Keywords

Survival, Patients, Antiretroviral Treatment, Bangui

1. Introduction

Human Immunodeficiency Virus (HIV) infection is a chronic infectious disease which, in the lack of appropriate treatment, leads to death as a result of the progressive destruction of the immune system by promoting the occurrence of opportunistic infections. To effectively combat this mortality, a medical intervention based on scientific evidence has existed since 1996. This is antiretroviral therapy with the combination of at least three drugs that have the capacity to prevent HIV replication and restore immune competence [1].

Introduction of this antiretroviral treatment in the therapeutic management of HIV infection has positively modified the epidemic's course by decreasing the incidence of opportunistic pathologies and prolonging the survival of AIDS patients [2] [3] [4]. Thus, with triple therapy, the survival of a person living with HIV is defined as the fact that the person lives beyond a certain time when death normally occurs. In 2019, approximately 690,000 people died of AIDS-related illnesses worldwide, compared with 1.7 million in 2004 and 1.1 million in 2010 [5]. The operational effectiveness of this therapy on long-term survival has been demonstrated in high-income countries [2] [6]. An increase in the life expectancy of people living with human immunodeficiency virus (PLHIV) has been described, although it remains lower than that of the general population [2]. An analysis of survival after AIDS focusing on cases diagnosed between 1993 and 1995, the period before combination ARVs (cARVs), and between 1998 and 2000, when cARVs were introduced, shows that the 5-year probability of dying from AIDS decreased from 40% for the period 1993-1995 to 11% for 1998-2000 [2]. HIV infection has thus become a chronic condition that can be managed with the assurance of a long and healthy life [2] [7] [8] [9]. With the introduction of triple therapy and the increase in life expectancy, new causes of death have appeared [1] [10].

In the South, mortality data for PLHIV on antiretroviral therapy (ART) show higher early mortality than in rich countries, with the causes of death largely dominated by diseases classified as AIDS, including tuberculosis [11] [12] [13] [14]. In addition, several studies on the efficacy of ART in Africa have found satisfactory short-term survival rates [15] [16] [17] [18]. These early short-term studies have confirmed the feasibility of antiretroviral (ARV) programmes in the African context and have led to significant resource mobilization [4]. The aim of this study is to contribute to improving the survival of patients on ARVs.

2. Methods

2.1. Study Design

This was a historical cohort study that took place at the Outpatient Treatment

Centre (OTC) of the Community Hospital Centre (CHUC), which is one of the reference structures for the management of HIV/AIDS infection in Bangui. The study was carried out from 19 October to 19 February 2021.

2.2. Study Population and Sampling

Our study population consisted of all HIV-positive patients followed up at OTC during 2015. All patients, former or new, who initiated ART in 2015 were included, and all those enrolled in the 2015 cohort but who had already started triple therapy elsewhere prior to their inclusion at the OTC were excluded. We opted for a non-probability sampling of convenience with full inclusion of patients responding to the inclusion criteria, received at the Bangui OTC during the study period. We obtained a total of 145 patients.

2.3. Variables

The main variable is the survival of patients on ART (alive or dead). The explanatory variables for patient survival are of various kinds. Socio-demographic characteristics include age, gender, marital status, educational level and occupation. Clinical, biological and therapeutic characteristics include body mass index, WHO clinical stage, change of treatment line and compliance. Finally, patients are classified as living, deceased, lost to follow-up and transferred (when patients change treatment location).

2.4. Data Collection

Data were collected from patient records, SANTIA software, Pre-ART and ART registers. The data were collected using a data form.

2.5. Data Analysis

The Microsoft Excel version 2013 spreadsheet was used to compile the database. The data collected was analyzed using Epi-info software version 7.2.

The socio-demographic, clinical, biological and therapeutic characteristics of patients on ART were expressed as absolute and relative frequencies for the qualitative variables, and as mean (standard deviation), median (Q1 and Q3) for quantitative variables. The frequency of patients on ART after five years of follow-up was obtained with the different proportions of patients alive, dead, lost to follow-up and transferred initiated to ART by relating their observed numbers of each class to the total number of patients. Survival probability was estimated by relating the number of patients alive to the total number of patients alive and deceased at the time point. The Kaplan-Meier method was used to describe the survival curve as a function of explanatory variables since inclusion in the cohort and a Log rank test was used to compare the survival curves. Death was confirmed by examination of the hospital death register, or by registration through ART adherence by calling the registered telephone number and living individuals. Bivariate (crude analysis) and multivariate (adjustment) analyses were performed

using the Cox (adjusted hazard ratio) method with a 95% confidence interval (CI). From the bivariate Cox regression, variables with a p-value of less than 0.25 were candidates for Cox regression. Then, from the multiple Cox regression, variables with p-value <0.05 were declared as predictors of poor survival.

2.6. Ethical Considerations

The study was approved by the Ethical and Scientific Committee of the Inter-State Centre for Higher Education in Public Health of Central Africa (CIESPAC) with N˚0012/CSERC/CIESPAC/2020. Data collection was carried out in strict compliance with the Declaration of Helsinki, which stipulates that no intervention that could alter the dignity, integrity and right to privacy of patients will be carried out.

3. Results

3.1. Baseline Characteristics

Table 1 describes the socio-demographic characteristics of the participants. Of the 145 patients enrolled, the median age (Q1; Q3) at the start of treatment was 41 years (36; 49). A female predominance was noted with 77.93% of cases (113/145). A large proportion of patients, 46.89% (68/145), had a secondary education. Couples were the most represented, 48.97% (71/145).

3.2. Clinical, Biological and Therapeutic Characteristics of Patients

More than half of the participants on ART in 2015 had a BMI of over 18.5 and a CD4 count of over 350/mm^3 respectively, and were in the advanced stage (WHO stage III) of the disease. Anemia was present in 88 patients. Adherence to treatment was observed in 32 patients (22.07%) and could not be measured in 19 patients (13.10%) because they had either died or been lost to follow-up before the first six months of treatment. The most common comorbidity observed was tuberculosis with a proportion of 21.38% (Table 2).

3.3. Survival of Patients on ART for 5 Years

Participants who were still alive and followed in the care circuit at the time of point were 85 or 58.62% (95% CI: 50.15 - 66.73), 13.10% of the patients, 19/145 had died (95% CI: 7.53 - 18.91), Figure 1. Regarding deaths, the majority (72.22%) occurred within two years of starting treatment: 09 within 6 months and 04 between 6 and 12 months. Of the deaths within 6 months, 07 were aged between 36 - 40 years, 08 were anemic and 06 had a CD4 count <50 µL.

During the 942 person-years of observation, the mortality rate was 2.02 (95% confidence interval: 1.93 - 2.11) per 100 person-years. The overall survival probabilities at 6 months, 12, 24, 36, 48 and 60 months were 95.9% (95% CI: 93.1 - 97.5), 93.8% (90.6 - 95.9), 90.4% (86.6 - 93.2), 84.9% (80.0 - 88.8) and 72.8% (95% CI: 61.2 - 81.4). Kaplan-Meier estimates for overall survival rates are presented in Figure 2.

Table 1. Distribution of patients on ART according to socio-demographic characteristics at the Bangui University Community Hospital.

Variables		Frequency, n (%)		Total (n = 145)
		Death (n = 19)	Censored (n = 126)	
Age (years)				
Median (Q1; Q3)	41.00 (36.00; 49.00)			
	22 -35	05 (14.29)	30 (85.71)	35 (24.14)
	36 - 40	07 (19.44)	29 (80.56)	36 (24.83)
	41 - 48	03 (08.82)	31 (91.18)	34 (23.45)
	49 - 69	04 (10.00)	36 (90.00)	40 (27.59)
Sex				
	Male	06 (33.33)	26 (66.67)	32 (22.07)
	Female	13 (11.50)	100 (88.50)	113 (77.93)
Educational level				
	None	02 (15.38)	11 (84.62)	13 (08.97)
	Primary	09 (17.65)	42 (82.35)	51 (35.17)
	Secondary	07 (10.29)	61 (89.71)	68 (46.89)
	Higher	01 (07.69)	12 (92.31)	13 (08.97)
Profession				
	Unemployed	07 (12.28)	50 (87.72)	57 (39.31)
	Students	01 (08.33)	11 (91.67)	12 (08.28)
	Employed	02 (16.67)	10 (83.33)	12 (08.28)
	Informal sector	09 (14.06)	55 (85.94)	64 (44.14)
Marital status				
	Single	03 (13.04)	20 (86.96)	23 (15.86)
	Couple	12 (16.90)	59 (83.10)	71 (48.97)
	Widowed	02 (06.90)	27 (93.10)	29 (20.00)
	Divorced	02 (09.09)	20 (90.91)	22 (15.17)
Tobacco				
	Yes	01 (11.11)	08 (88.89)	09 (06.21)
	No	18 (13.26)	118 (86.74)	136 (93.79)
Alcohol				
	Yes	06 (14.29)	36 (85.71)	42 (28.97)
	No	13 (12.62)	90 (87.38)	103 (71.03)

Table 2. Distribution of patients on ART according to clinical and therapeutic at the Bangui University Community Hospital.

Variables	Frequency, n (%)		Total (n = 145)
	Death (n = 19)	Censored (n = 126)	
BMI (Kg/m^2)			
≤18.5	08 (14.29)	48 (85.71)	56 (38.62)
>18.5	11 (12.36)	78 (87.64)	89 (61.38)
CD4 cells count (µL)			
<50	06 (42.86)	08 (57.14)	14 (09.66)
51 - 200	03 (08.57)	32 (91.43)	35 (24.14)
201 - 350	04 (09.76)	37 (90.24)	41 (28.27)
>350	06 (10.91)	49 (89.09)	55 (37.93)
WHO clinical staging			
Stage I	03 (12.50)	21 (87.50)	24 (16.55)
Stage II	00 (00.00)	09 (100.00)	09 (06.21)
Stage III	11 (10.68)	92 (89.32)	103 (71.03)
Stage IV	05 (07.69)	04 (92.31)	09 (06.21)
Anemia			
Yes	16 (18.18)	72 (81.82)	88 (60.69)
No	03 (05.26)	54 (94.74)	57 (39.31)
Opportunistic infections			
Yes	12 (21.43)	44 (78.57)	56 (38.62)
No	07 (07.87)	82 (92.13)	89 (61.38)
Co-infection TB/HIV			
Yes	06 (19.35)	25 (80.65)	31 (21.38)
No	13 (11.40)	101 (88.60)	114 (78.62)
Therapeutic plan change			
Yes	01 (04.17)	23 (95.83)	24 (16.55)
No	18 (14.88)	103 (85.12)	121 (83.45)
Years on treatment			
1	09 (45.00)	11 (55.00)	20 (13.79)
2 - 3	06 (24.00)	19 (76.00)	25 (17.24)
4 - 6	04 (04.00)	96 (96.00)	100 (68.97)
ART adherence			
Yes	06 (25.00)	24 (75.00)	32 (22.07)
No	05 (05.32)	89 (94.68)	94 (64.83)
Not applicable	08 (42.11)	11 (57.89)	19 (13.10)

3.4. Factors Associated with Mortality in Patients on ART

We were unable to demonstrate a relationship between the age of patients on ART, their sex and the notion of tuberculosis co-infection and the occurrence of death. However, patients with a CD4 count above 50/µL were less likely to die than patients with a CD4 count < 50/µL. After adjustment, the factors associated with death in patients on ART were having anemia, being in stage IV disease, having a CD4 count greater than 50/µL and having good compliance (Table 3). Thus, patients with anemia or poor adherence to therapy were more likely to die than those without anemia or adherent to therapy: RR = 1.64 (1.07 - 15.81), p = 0.039; RR = 1.41 (1.20 - 2.66), p = 0.021 respectively. Patients who were in HIV stage IV were 4 times more likely to die than those in stage 1: RR = 4.1 (1.90 - 18.81), p = 0.047.

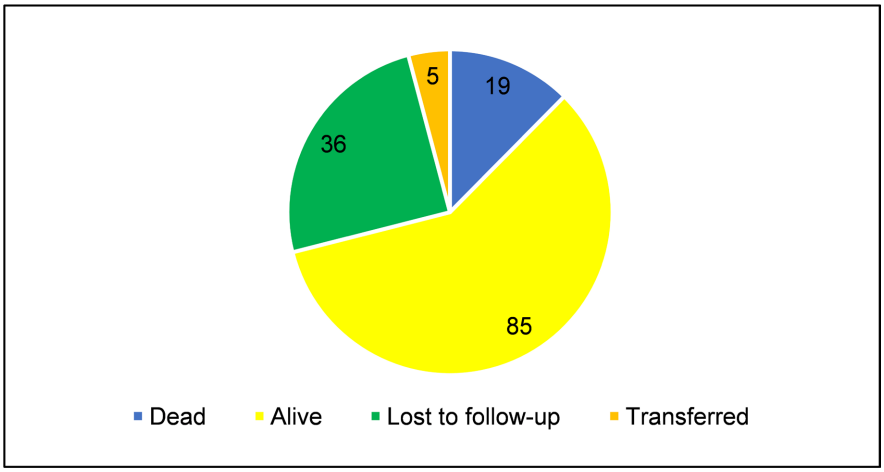


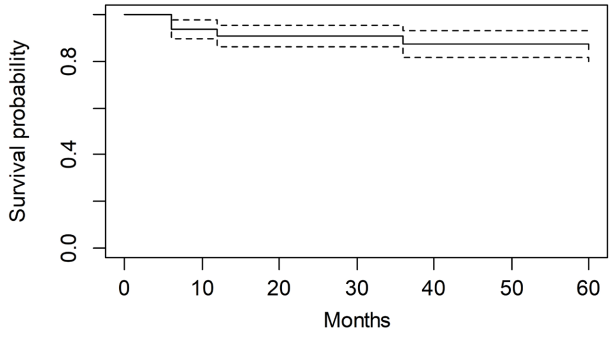
Figure 1. Patient outcomes five years after ART initiation.

Table 3. Results of the bivariate and multivariate Cox regression analysis of HIV patients receiving antiretroviral treatment at the Bangui University Community Hospital (n = 145).

Characteristics	Hazard ratio (95% CI)	p	Adjusted Hazard ratio (95% CI)	p
Age (years)				
22 - 35	1	-		
36 - 40	1.43 (0.46 - 4.52)	0.538		
41 - 48	0.57 (0.14 - 2.40)	0.446		
49 - 69	0.69 (0.18 - 2.56)	0.578		
Sex				
Male	1.81 (0.21 - 1.46)	0.230		
female	1	-		

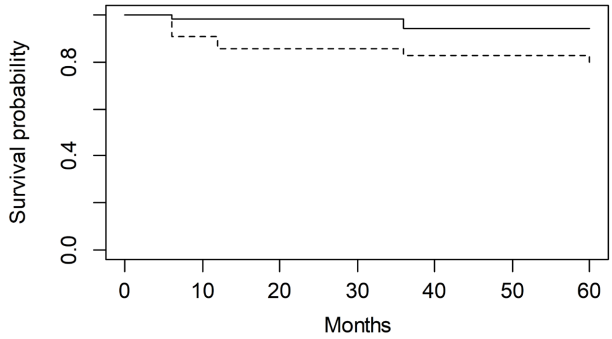
Continued

Tobacco				
Yes	0.78 (0.10 - 5.82)	0.806		
No	1	-		
Alcohol				
Yes	1.06 (0.40 - 2.79)	0.907		
No	1	-		
ART adherence				
Yes	1	-	-	-
No	4.69 (1.66 - 13.26)	0.0035	1.41 (1.20 - 2.66)	0.021
BMI				
<18.5	1	-		
≥18.5	0.74 (0.30 - 1.85)	0.525		
Anemia				
Yes	4.05 (1.18 - 13.93)	0.026	1.64 (1.07 - 15.81)	0.039
No	1	-		
CD4 cells count (µL)				
<50	1	-		
51 - 200	0.12 (0.03 - 0.49)	0.003	0.08 (0.02 - 0.34)	< 0.001
201 - 350	0.14 (0.04 - 0.49)	0.002	0.23 (0.06 - 0.84)	0.027
>350	0.15 (0.05 - 0.48)	0.001	0.21 (0.06 - 0.82)	0.024
WHO clinical staging				
Stage I	1	-		
Stage II	0.00 (0.00 - 1.01)	0.989	0.01 (0.00 - 1.91)	0.698
Stage III	0.87 (0.24 - 3.12)	0.830	0.58 (0.14 - 2.39)	0.454
Stage IV	5.12 (1.22 - 21.48)	0.025	4.01 (1.90 - 18.81)	0.047
Opportunistic infections				
Yes	2.71 (1.07 - 6.89)	0.036	2.02 (0.68 - 6.03)	0.210
No	1	-		
Co-infection TB/HIV				
Yes	1.55 (0.59 - 4.09)	0.373		
No	1	-		



death: solid line; no death: dashed line

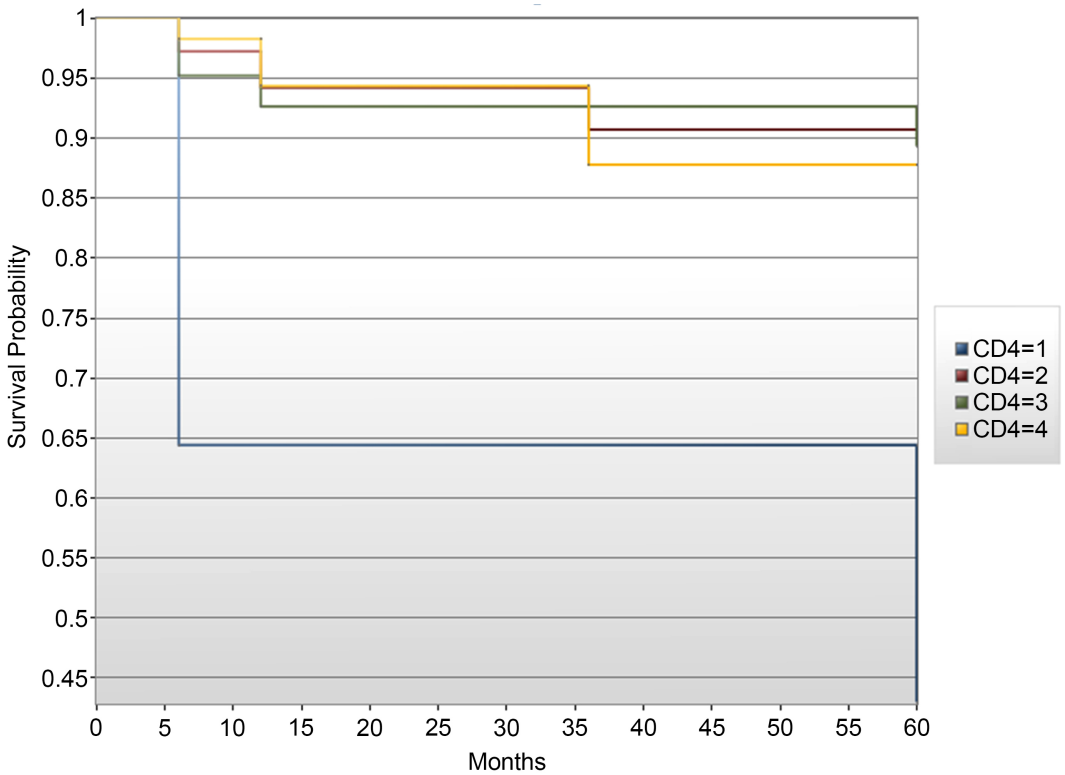
(a)



Log-Rank test: 5.819, p = 0.016

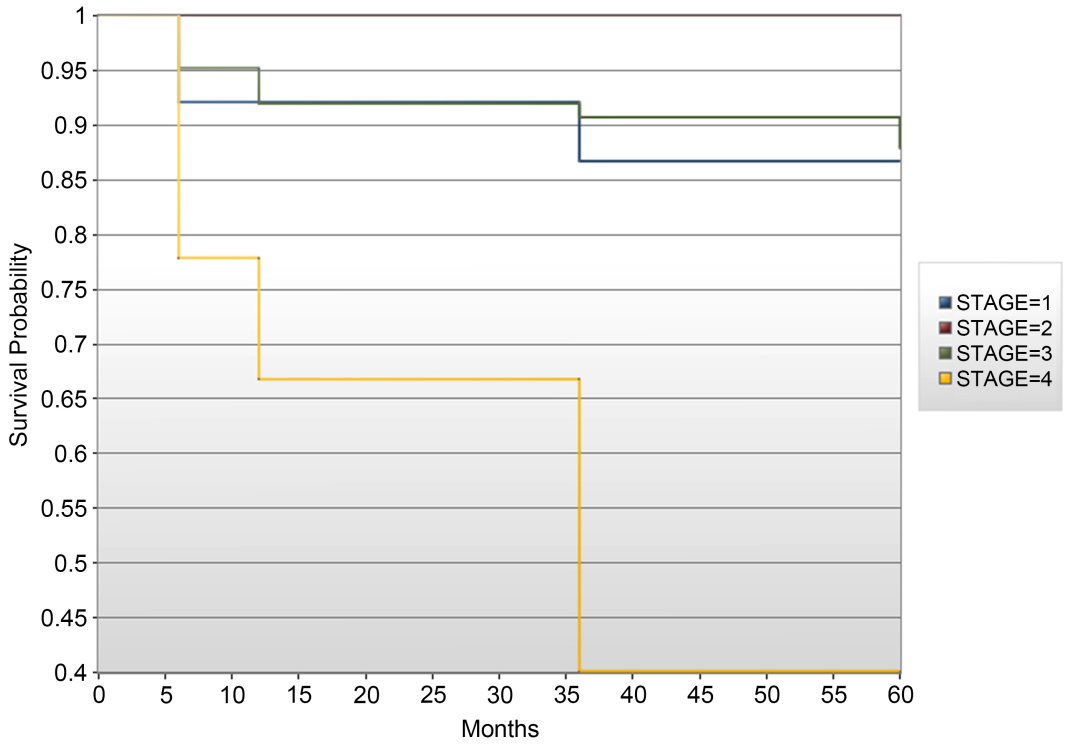
anemia: solid line; no anemia: dashed line

(b)



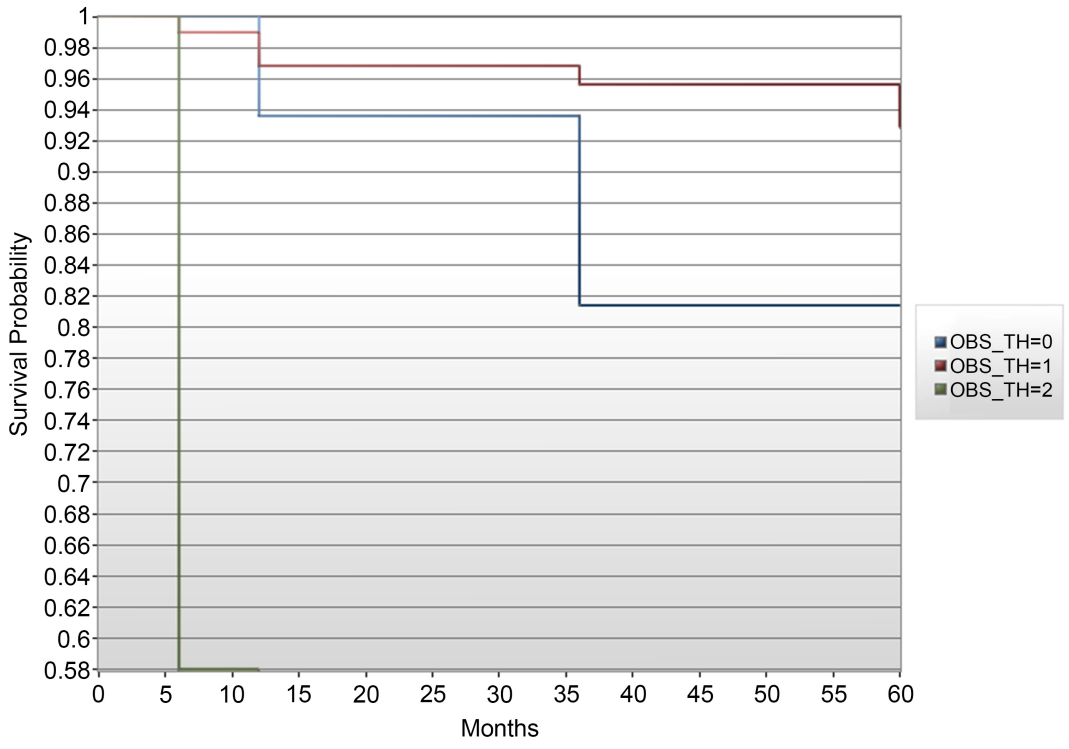
Log-Rank test: 21.514, p = 0.0001

(c)



Log-Rank test: 17.379, p = 0.0006

(d)



Log-Rank test: 48.015, p < 0.001

(e)

Figure 2. Kaplan-Meier survival plots for overall survival (a), anemia (b), baseline CD4 counts (c), baseline WHO clinical stage (d) and therapeutic compliance (e).

4. Discussion

4.1. Socio-Demographic Characteristics of Patients on ART

The median age of our patients at initiation of treatment was 41 years. Our results are, for the most part, similar to those observed by other authors in the literature who have addressed the same subject as us [19] [20] [21]. These results, which are similar to ours, could be explained by the fact that this patient population represents the most active segment of society in terms of social, professional and sexual life. On the other hand, some authors have reported a lower median age than ours: 31 years or even 34.8 years [22] [23]. These lower results may be explained by the presence of pediatric samples in the various cohorts.

A female predominance was noted in our study at ART initiation with 77.93% (113/145) versus 22.07% (32/145) for men. This female predominance varies between 55% - 71% according to certain studies [14] [18] [20]-[25]. In our context, this can also be explained by the fact that all women tested positive for HIV during prenatal consultations through the prevention of mother-to-child transmission (PMCT) or gynecological programmes at the university hospital are systematically referred to the OTC for treatment with antiretroviral drugs. Furthermore, UNAIDS reports that the feminization of the pandemic is explained by the fact that women are probably more likely to be infected with HIV during any type of sexual intercourse than men due to biological factors, that they are more vulnerable due to their lack of financial autonomy and more exposed to sexual violence [26]. Measures must be taken to protect women and girls from all forms of sexual assault and to mobilize PMCT spouses towards testing.

4.2. Clinical and Therapeutic Characteristics of Patients on ART

Just over ¾ of participants on ART in 2015 had a CD4 count above 200/mm^3. Our results are consistent with those found in Ethiopia or Malaysia [27] [28]. Adherence to treatment allows patients to have a high enough CD4 count for their clinical balance. However, more than half of these patients are at an advanced stage, WHO stage III. This situation could be explained by the fact that the majority of patients were tested late for HIV in the context of the politico-military crisis. It is imperative to accelerate and multiply awareness sessions in order to encourage the population to undergo systematic voluntary screening.

During the follow-up, anemia developed in 88 patients. Anemia, as determined by baseline hemoglobin levels, is a well-known predictor of patient survival in HIV patients. The current study also found that anemia is one of the most important factors for mortality in these patients, which is consistent with the results of some studies [27] [28].

4.3. Patient Outcomes after Five Years of ART Follow-Up

Of the 145 patients who started ART in 2015, 85 were still alive at the point of care. Similar situations have been described by other authors. Proportions of pa-

tients still alive at the end of the study have been reported to vary between 76 and 84% after five to six years of ART [14] [19] [23] [27]. These minor differences in proportions observed between our study and those of other studies may be related to methodological aspects, in particular, the size of the samples. Indeed, our study involved a sample of 145 subjects, whereas the other studies have a sample size varying between 350 and 8310 PLHIV on treatment. These results can be explained by the fact that the majority of our patients started triple therapy without opportunistic pathologies, *i.e.* 60.24% of the cases, with a fairly satisfactory nutritional status: BMI above 18.5 for 67.47% of the cases and CD4 counts above 350/mm^3 for 57.83% of the cases in accordance with the 2014 WHO guidelines [29]. Maximizing the preventive effects of antiretrovirals by expanding antiretroviral therapy coverage to all people living with HIV and applying a strategic combination of pre- and post-exposure prophylaxis and other prevention interventions would be necessary to improve their survival [4].

At the endpoint, 19 out of 103 patients had died, *i.e.* a lethality of 18.45%. Several authors have addressed the same subject as us [9] [14] [19] [20] [24] [30] and the lethality varies from one study to another ranging from 2.3% to 24.6%. This can be explained that deaths were significantly associated with a very advanced stage, WHO stage IV of the disease with $p = 0.003$. The late arrival of patients in the care setting due to ignorance of their serological status, but also the indigence of patients, especially in our context of limited resources, may be important explanatory factors of this lethality. Some of the lower results may be explained by the late implementation by CAR of the 2015 WHO recommendations to treat any HIV-positive patient regardless of clinical stage and CD4 count. However, some studies have reported the enrolment of patients in a very worrying immune status with the consequence of observed deaths [26].

Our results showed that 24.83% of our patients were lost to follow-up at the endpoint. Our observations differ from those reported in Gabon, where the proportion of patients lost to follow-up was 33.5% [25], linked to CD4 counts above 500/mm^3. Other studies have reported lower results in the range of 2% - 12.6% in Benin, Ethiopia, Kenya and China [9] [14] [19] [31]. These differences in results can be explained by the military-political crises that have shaken the country since 2013, forcing people to move. The high rate of missing persons observed in our study is significant and calls for the urgent implementation of a national strategy to actively search for missing persons.

4.4. Patient Survival after Five Years of ART

Our results showed a 5-year survival probability of 82.5%. Similar results to ours have been reported in some studies [9] [14] [30] [32]. These results can be explained by the fact that more than half of the living and deceased patients (59.0%) had a good immunological status, a CD4 count higher than 350/mm^3 at the initiation of ART or that there is an improvement in the quality of patient management and follow-up.

4.5. Factors Associated with Mortality on ART

In multivariate analysis, risk factors for mortality were identified, including very advanced disease, WHO stage IV, anemia and adherence. On the other hand, a high CD4 count reduces the risk of death. Several authors have made the same observations [22] [33] [34] [35] [36] [37], highlighting other explanatory factors such as the presence of opportunistic infections and co-infection of HIV with tuberculosis. This can be explained by total ignorance of the serological status until arrival in the care circuit, and also by self-medication. Promoting early detection and treatment of HIV infection, Isoniazid prophylaxis for TB in all HIV-infected patients and early and optimal management of opportunistic infections combined with nutritional support would reduce HIV-related mortality.

However, studies in Ethiopia and China have found a relationship between the occurrence of death and the marital status, education level and TB-HIV co-infection of participants [27] [34]. These differences from our results can be explained in two ways. Firstly, these studies were carried out in rural areas, unlike ours, which was carried out in the capital of the Central African Republic, where the patients are supposed to have access to antiretroviral treatment and a minimum level of care, as well as a fairly high level of education. In fact, more than 3/4 of the participants have a fairly high level of education. Secondly, we have a rather small sample size compared to other studies. In all cases HIV and TB accelerate each other's disease progression, creating a lethal combination. TB is the leading cause of death in HIV-positive patients. Disease management in HIV patients co-infected with TB is complicated by interactions between drugs used in the treatment of HIV and TB.

4.6. Study Limitations

We did not include some possible predictors of survival on antiretroviral therapy such as plasma viral load, history of comorbidities. The dates and main causes of death of the patients were also not provided in the vast majority of cases.

5. Conclusion

A total of 145 treatment-naive patients were started on ART. The median age of the patients at the start of treatment was 41 years with a female predominance of about 78%. More than half of the patients followed up had a CD4 count above 200 cells/mm^3, almost 3/4 were in WHO clinical stage III and 60% had anemia. The probability of overall survival after 60 months of follow-up on ART was 72.8% and mortality was significantly associated with very advanced disease (WHO stage IV), the presence of anemia, CD4 count and non-compliance. Early treatment of people living with HIV combined with better quality of care would improve their survival.

Acknowledgements

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for authorising this study, as well as all the staff of the Outpatient Treatment Centre of the University Hospital.

Authors' Contributions

SHW, PRJMY conceived and designed the research. Contribution to data collection and ethical committee and statistical analysis: SHW, JSSA, DN, HN, PMT. All authors read and approved the final version of the manuscript.

Data Availability

The datasets used and analyzed during the current study available from the corresponding author on reasonable request. The datasets generated and/or analyzed during the current study are not publicly available due to the promise made to participants to keep the data confidential when they are questioned, but are available from the corresponding author on reasonable request.

Ethical Approval

The study was approved by the Ethical and Scientific Committee of the Inter-State Centre for Higher Education in Public Health of Central Africa (CIESPAC) with No. 0012/CSERC/CIESPAC/2020. Data collection was carried out in strict compliance with the Declaration of Helsinki, which stipulates that no intervention that could alter the dignity, integrity and right to privacy of patients will be carried out.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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Appendix: Data Form

ID: /__/ /__//__/

1) Sociodemographic characteristics

Age: |__|__| years

Sex: 1-Male /__/; 2-Female /__/

Profession: 1-Unemployed /__/; 2-Student /__/; 3-Public servant /__/; 4-Businessman /__/; 5-Others /__/ (to be specified) _____

Education level: 1-None/__/; 2-Primary/__/; 3-Secondary /__/; 4-Superior/__/

Matrimonial status: 1-Single /__/; 2-Living with a partner /____/; 3-Widow; 4-Divorced /__/

2) Clinical and biological factors

BMI M0: 1 ≤ 18.5/__/; 2 ≥18.5/__/

CD4 M0: 1 ≤ 50/mm^3/__/; 2 = 51 - 100/mm^3 /__/; 3 = 101 - 200/mm^3 /__/; 4 = 201 - 350/mm^3 /__/; 5 ≥ 350/mm^3 /__/

Plasma viral load: 1-M0 /__/ copies/l; 2-M12 /__/ copies/l; 3-M24 /__/ copies/l; 4-M48 /__/ copies/l; 5-M60 /__/ copies/l

WHO Clinical Stage M0: 1-Stage I /__/; 2-StageII /__/; 3-Stage III /__/; 4-StageIV /__/

Anemia: 1 = Yes /__/; 2 = No /__/

Therapy protocol: 1 = 1st line /__/; 2 = 2nd line /__/; 3 = 3rd line /__/

Number of years on treatment: 1 = <1 year /__/; 2 = 1 - 2 years /__/; 3 = 2 - 3 years /__/; 4 = 3 - 6 years /__/; 5 = 6 - 8 years /__/; 5 = >8 years /__/

Therapeutic line change: 1 = Yes /__/, 2 = No /__/

If yes, reasons: 1-Adverse effects /__/; 2-ARV breakup /__/; 3-Others /__/

Therapeutic compliance: 1 = <95 /__/; 2 = >95 /__/

Opportunistic Infections: 1 = Yes /__/; 2 = No /__/

If yes, which ones?

History: 1-Tobacco /__/; 2-Alcohol /__/; 3-Others /__/

Co-infection TB/HIV: 1 = Yes /__/; 2 = No /__/

Other comorbidities:

Main causes or context of death:

3) Patient outcomes

Survival: 1-M6 /__/; 2-M12 /__/; 3-M24 /__/; 4-M48 /__/; 5-M60 /__/

Transferred: 1-M6 /__/; 2-M12 /__/; 3-M24 /__/; 4-M48 /__/; 5-M60 /__/

Lost to follow-up: 1-M6 /__/; 2-M12 /__/; 3-M24 /__/; 4-M48 /__/; 5-M60 /__/

Dead: 1-M6 /__/; 2-M12 /__/; 3-M24 /__/; 4-M48 /__/; 5-M60 /__/