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Profile of the Blood Count among People Living with HIV Monitored at the Institute of Social Hygiene and the Aristide Le Dantec Hospital in Dakar

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Abstract

Introduction: The human immunodeficiency virus (HIV) is a pandemic of concern to the World Health Organization. It is all the more worrisome because if not properly managed, it can be responsible for several complications, including abnormal blood counts. These abnormalities may also be related to treatment. **Objectives:** The main objective of this study is to show that adequate antiretroviral therapy can correct various abnormalities exerted by HIV on patients' blood counts. The specific objective is to determine all the abnormalities we can see in blood count before and during HIV treatment. **Materials and Methods:** Our study was conducted in the hematology laboratory and the dermatology departments of the Aristide Le Dantec Hospital and the Institute of Social Hygiene. It took place from December 2009 to October 2011. It is a retrospective descriptive and analytical study involving HIV-positive patients (HIV 1 and 2) and under antiretroviral treatment (at least six months of treatment). We included 110 patients in the study. Blood counts were performed at the hematology laboratory of the Aristide le Dantec hospital using a KX21 automaton. Each patient received three blood counts during the first six months of treatment (M0, M3 and M6). A univariate analysis was performed to determine the profile of the abnormalities of the blood count and the chi 2 test was used and a threshold of $p < 0.05$ was considered significant. **Results:** The mean age of the patients was 38.6 ± 8.6 years (extremes of 18 and 64 years)

with a sex ratio of 0.42 (77 females and 33 males). The prevalence of anemia was 80% (n = 88) at M0, 53, 63% at M3 (n = 59), and 38.20% at M6 (n = 42) (p = 0.02). We noted a favorable evolution with treatment. For the other abnormalities, the evolution was favorable for leukopenia (p = 0.011) and thrombocytopenia (p = 0.007). **Conclusion:** Our study showed a correction of blood count abnormalities in PLHIV with antiretroviral treatment.

Keywords

Blood Count, Abnormalities, Antiretroviral Treatment, PLHIV

1. Introduction

Acquired immunodeficiency syndrome (AIDS) is the no of a set of symptoms following the progressive destruction of several cells of the immune system by a retrovirus: the human immunodeficiency virus (HIV).

HIV infection is a worldwide scourge. Several million people are infected with all social categories ranging from newborns to the elderly, with predominance in the female sex in 2019 [1]. In Senegal, the prevalence in 2019 is 0.5% with an uneven distribution across regions (Rapport de situation sur la riposte nationale a l'épidémie de VIH/SÉNÉGAL: 2019).

Indeed, more recent data (2018 report of the national AIDS control council) showed a regression in prevalence with however a greater in the regions of Ziguinchor (1.5%) and Kolda (1.5%) (87% of people living with HIV are on ARV treatment and 79% have a suppressed viral load or 20,927 people in 2018 according to the annual report of the national AIDS control council.

HIV/AIDS is a pathology that is all the more severe because it attacks different systems of the body, including the hematopoietic system [2] [3] [4]. Hematological abnormalities are common in HIV infection [4] [5]. Thus, the first cases of anemia and cytopenias have been described since the 1980s [5]. These, apart from HIV, may be due to the treatment [6]. Studies carried out on the subject elsewhere have revealed that cases of abnormalities of the haemogram can occur with antiretroviral treatment [6] [7] [8]. These reasons led us to carry out a study in Dakar in order to detect abnormalities of the haemogram with antiretroviral treatment with a view to improving management.

2. Objectives

The main objective of this study is to show that adequate antiretroviral therapy can correct the various abnormalities exerted by HIV on patients' blood counts.

3. Methods

3.1. Type, Population, Setting, and Study Period

We conducted a retrospective descriptive and analytical study from December 2009 to October 2011. The setting was the dermatology department of Aristide

Le Dantec Hospital and the Social Hygiene Institute for patient recruitment and the Hematology Laboratory of Aristide Le Dantec Hospital for biological analysis. We proceeded to a selection of the files between 2004 and 2011. After careful screening, we retained 110 patients. We included 77 women and 33 men in the study, which gives a sex ratio of 0.42. We determined for each patient the socio-demographic characteristics, the biological profile and the type of treatment.

3.2. Inclusion Criteria

We included all HIV-positive patients (HIV 1 and 2) who had a blood count before treatment, at three months and at six months of treatment (M0, M3 and M6). Transfused patients were not included.

3.3. Non-Inclusion Criteria

Patients who did not have a pretreatment, three-month, and six-month blood count and were non-adherent or lost to follow-up patients were not included in the study.

3.4. Sampling and Testing

All patients received three blood counts. Samples were collected on EDTA tubes at a rate of 5 ml of blood and the analyses were performed on the same day on a Sysmex KX21 automated system. Blood smears stained with May Grunwald Giemsa (MGG) were performed to confirm the abnormalities given by the blood count.

3.5. Definition of Blood Count Reference Values

Considering the interracial variability of blood count parameters, we referred to the reference values defined by the World Health Organization (WHO).

3.6. Erythrocyte Lineage

Anemia: male: Hb < 13 g/dl and female: HB < 12 g/dl.
Microcytosis: Mean blood volume (MBV): <80 fl.
Hypochromia: mean corpuscular Hb concentration (MCHC) < 32%.

3.7. Platelet Lineage

Thrombocytosis: platelet count (PLQ) >450.000/mm3.
Thrombocytopenia: platelet count (PLQ) <150,000/mm^3.

3.8. Leukocyte Lineage:

Hyperleukocytosis: White blood cell count > 10,000/mm^3.
Lymphopenia: Lymphocyte count < 1000/mm^3.
Neutropenia: Neutrophil count < 1500/mm^3.
Hypereosinophilia: Eosinophil count > 400/mm^3.

3.9. Statistical Analyses

The data set was analyzed by Epi info 2000 software and we used the Chi^2 test for

all calculations. We considered any p value < 0.05 to be significant.

4. Results

4.1. Socio-Demographic Data

Out of a total number of 110 patients, the female sex was the most represented with 70% (n = 77) compared to 30% for the male sex (n = 33) making a sex ratio of 0.42. The mean age of the patients was 38.6 ± 8.6 years (extremes 18 and 64 years). The most represented age range was 18 to 40 years with 61.8% (n = 62), followed by 40 to 64 years with 38.2% (n = 38) (Table 1).

4.2. Clinical Data

The most represented circumstances of discovery were viral infections, followed by parasitic infections then bacterial infections (Table 2).

Table 1. Sociodemographic profiles of the patients.

	Age in years:		Marital status		SEX		Ethnic group		
	18 - 40	40 - 64	Married	Single	Female	Male	peulhs	Wolofs	Others
Patients	62	38	63	37	70	30	34	25	41

Table 2. Clinical profile of the patients.

Type of condition	Type of diseases	Number of patients
	zona	47
Viral infections	kaposi	15
	Hepatitis B	2
	condylomas	1
Parasitic infections	Toxoplasmosis	3
	Scabies	5
Bacterial infections	tuberculosis	5
mycotic diseases	profuse mycosis	1
Lymphomas	Lymphoma HTLV1	2
Tumor diseases	Kahler's myeloma	2
	Eczema	3
	Erythroderma	2
inflammatory dermatoses	Prurigo	14
and immuno-allergic	Seborrheic dermatitis	2
	Psoriasis	2
	Necrotizing fasciitis	2
Others	Ascites	1

4.3. Therapeutic Data

The therapeutic protocol according to the biological profile of the patient, gave the following results: 106 patients were HIV 1 and 4 were HIV2. The most given protocol was AZT/3TC/NVP/Bactrim (Table 3).

4.4. Biological Data

The anemia was microcytic hypochromic in 16 patients at M0 and in 4 at M6.

It was normochromic macrocytic in 17 patients at M0 and in 32 at M6, and normocytic normochromic in 47 patients at M0 and in 21 at M6. We note an evolution of macrocytosis with the evolution of treatment. Table 4 summarizes the effects of the therapeutic protocol on anemia between M0 and M6 (Table 4 and Table 5).

We note the influence of the duration of treatment on anemia, leukopenia and thrombocytopenia.

5. Discussions

Our study allowed us to document the hematological follow-up of antiretroviral therapy with a sample of one hundred and ten (110) patients. The aim of this study was to follow the abnormalities of the haemogram during antiretroviral

Table 3. Distribution of patients according to therapeutic protocol.

Combination	pharmaceutic class	Treatment protocol	Number of patients
AZT/3TC/EFV	2 NRTI + 1 NRTI	1st line	08
AZT/3TC/EFV/Bactrim	2 NRTI + 1 NNRTI + SAB	1st line	19
AZT/3TC/NVP	2 NRTI + 1 NNRTI	1st line	12
AZT/3TC/NVP/Bactrim	2 NRTI + 1 NNRTI + SAB	1st line	57
Others	2 NRTI + 1 NNRTI	1st and 2nd line	14
TOTAL			110

NRTI: Nucleoside reverse transcriptase inhibitor. NNRTI: Non-nucleoside reverse transcriptase inhibitor. PI: Protease inhibitor, SAB: Antibacterial sulfonamides.

Table 4. Evolution of anemia according to the therapeutic protocol.

Therapeutic combination	number	Anemia M0	Anemia M6	P	OR
AZT/3TC/EFV or NVP	27	16	6	M0 0.026	
Bactrim AZT/3TC/EFV or NVP	69	62	33	M6 0.276	1.086
without AZT or Bactrim	14	10	3		
TOTAL	110	88		42	

Table 5. Distribution of patients according to blood count abnormalities and biological profile between the first and sixth month of treatment.

Abnormalities	Month	Type and number		P
		VIH1 (106)	VIH2 (4)	
anemia	M0	84	4	
	M6	39	3	0.02
Lymphopenia	M0	21	0	
	M6	7	0	0.369
Leucopenia	M0	31	2	
	M6	24	1	0.011
Thrombocytopenia	M0	7	0	
	M6	1	0	0.007
Neutropenia	M0	62	3	
	M6	26	1	0.36
Hypereosinophilia	M0	34	1	
	M6	21	1	0.03

treatment.

Our assessment of adherence was limited to patients' self-reporting of ARV use and did not allow us to assess the role of regularity. However, macrocytosis was present in 75% of patients and may reflect good compliance with AZT.

The limitations of this study include the lack of complete viral load testing and the absence of data collection from patients not followed up in services other than dermatology.

Regarding the socio-demographic data, 70% of the patients were female. This predominance of women is consistent with the 2009 UNAIDS report, where women represent nearly 50% of all PLWHA and more than 60% in sub-Saharan Africa. This feminization of the disease could be explained by the practice of polygamy in these countries. The mean age of the patients was 38.61 ± 8.7 years with extremes of 18 to 64 years. The most affected age group was 18 - 40 years. The sex ratio was 0.42. These results are close to those of Karakodjo D E, who found a mean age of 31.98 years in Mali in 2011 and those of Ndaw H in 2011 who found a mean age of 38.61y ± 11.11, with the most affected age range between 20 and 29 years and a sex ratio in favor of women [4] [6]).

The most represented age group was 18 - 40 years. This could be explained by the strategy of our country in accordance with the policy of the World Health Organization (WHO), which consists of voluntary screening and prevention of mother-to-child transmission (CNLS Report 2018).

Clinically, 13% (n = 15) of the patients were in the AIDS stage and 87% (n = 97) were in stage II of the WHO classification, which testifies to the considerable efforts in early diagnosis and screening of HIV infection in Senegal (CNLS Re-

port 2018).

Forty-two percent (42%, n = 47) of our patients consulted dermatology for herpes zoster, 13.63% (n = 15) for kaposi and 12.62% (n = 14) for prurigo. Kaposi is one of the most common dermatological affections retrieved in PLWH despite the treatment [9]. The main reasons for consultations in our study are found in the study of Keita L in Mali in 2017, where 5.81% consulted for kaposi and 24.52% for prurigo, 74.19% for oropharyngeal candidiasis, 6.45% for genital herpes, 5.81% for Kaposi's and 3.23% for shingles [10]. More recent studies have found a predominance of herpes zoster as a reason for consultation in dermatology for PLWH [11] [12] [13].

In our study, the HIV 1 profile was predominant with 96% of patients (n = 103), followed by the HIV 2 profile with 2% (n = 2) and the dual HIV 1 and 2 profile with 2% (n = 2). This distribution remains in agreement with the worldwide predominance [1]. Bréma C found a prevalence of 96.5% of HIV 1 patients, followed by a prevalence of 3.5% for HIV 2 [14].

On the hematological level, HIV leads to several abnormalities of the hemogram, of which cytopenias are the most frequent [4] [6]. In our study, at the beginning of inclusion, anemia was present in 80% as well as other cytopenias (thrombocytopenia 6.36%, leukopenia 27.27%, neutropenia 59.09%, etc.) described by several other studies [4] [5] [6]. In most studies, anemia was the most frequent abnormality [4] [5] [7] [14]. It was normocytic normochromic in 54% of cases. This high prevalence of anemia could be explained by the fact that the virus attacks the cells of the hematopoietic system and by the opportunistic and parasitic infections generated [5] [14] [15].

The current benefit of antiretroviral therapy is well established. However, it requires good compliance and regular biological monitoring, including blood counts and viral load. It is within this framework that we have monitored the impact of antiretroviral treatment on blood count parameters for six months. The results of our study are rather encouraging.

Thus, we found a regression of the prevalence of anemia in our patients after six months of compliance (M6) with a statistically significant difference (80% at M0 and 38.20% at M6, p = 0.02). For the different cytopenias, we observed a clear correction after six months of treatment. Neutropenia went from 29.09% at M0 to 24.54% at M6 (p = 0.360), thrombocytopenia from 6.36% at M0 to 0.90% at M6 (p = 0.007), leukopenia from 30% at M0 to 22.72% at M6 (p = 0.011). Our results are superimposed on those of Karfo R *et al.* In this study, the rate of patients with anemia had a statistically significant regression: (47.1%) at M0, (36%) at M6, (16.6%) at M12 [16]. The same study, however, did not find a significant difference between the beginning and the 12th month of treatment with regard to thrombocytopenia. However, the Ndaw H study in Mali found normocytic normochromic anemia at 63.64% at initiation, 75% at 3 months, 50% at 6 months and 42.88% at 12 months of ARV treatment [7]. With the study of Ndaw H, the white blood cell count was normal in the majority of cases throughout the

study *i.e.*, 78.26% initially, 87.5% at 3 months, 81.81% at 6 months and 73.68% at 12 months. However, she found progressive but less frequent leukopenia throughout the follow-up, *i.e.*, 12.5% at 3 months, 18.182% at 6 months and 26.31% at 12 months.

We found hypereosinophilia corrected by the antiretroviral treatment (31, 81% at M0 and 20% at M6, P = 0.03). This hypereosinophilia at the beginning of the treatment could be explained by the disturbance of the immune response by HIV, parasitosis and dermatological affections

In total, we note that HIV infection leads to haematological disturbances that can be corrected with good therapeutic management.

6. Conclusion

The conduct of this study allowed us to detect blood count abnormalities in people living with HIV. It also allowed us to detect a regression of these abnormalities with a regular follow-up of the treatment. This study shows that antiretroviral treatment improves the prognosis in terms of hematology. However, we noted that the treatment had very little influence on the neutropenia observed at the beginning of treatment in our study. It would therefore be more interesting to evaluate the long-term effects of this treatment on the hematopoietic system.

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Conflicts of Interest

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

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