



Research Article

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Clinical and radiological epidemiological features of smear-positive tuberculosis patients in the era of triple antiretroviral therapy

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Abstract

Introduction: The aim of this work was to compare the epidemiological, clinical and radiological aspects during bacilliferous tuberculosis between HIV positive patients under ARV treatment and HIV negative. **Methodology:** This was a prospective, descriptive and comparative study conducted from December 1, 2018 to May 31, 2019 (6 months) at Jamot Yaoundé Hospital. Smear-positive tuberculosis patients meeting our inclusion criteria were enrolled in the study. We split them into two groups, HIV + and HIV - Data were analyzed using SPSS 23.0 software. The comparison of the data was made by the Chi² test, that of the quantitative data with the Student's T test. A p-value less than 0.05 was considered significant. **Results:** For HIV positive, the mean age was 41.1 ± 14.4 years versus 39.8 ± 14.8 years in the HIV negative group. HIV + patients aged 35 to 44 were more represented [49.5 versus 17.1% (P <0.0001)]. The sex ratio was 1.03 for the HIV positive versus 3.31 for the HIV negative group. The HIV + group had fewer single people, had more history of tuberculosis (22.2 versus 9.8%). HIV + patients were more likely to have a WHO performans status score 4, and were more febrile [96.8 versus 85.4% (p = 0.021)]. The normal chest x-ray was more common. Interstitial and alveolar syndromes were less common. **Conclusion:** The proportions of both sexes were almost identical. Almost half were 35 to 44 years old They had more history of tuberculosis. A WHO score of 4 and were generally febrile. Chest x-ray was often normal. Interstitial and alveolar syndromes were less common.

Keywords: Tuberculosis, Smear positive - HIV – antiretrovirals.

INTRODUCTION

Tuberculosis (TB) infects one in three people worldwide, or more than 2 billion people infected ^[1]. In the 1980s, with the advent of HIV, tuberculosis emerged as an opportunistic disease associated with AIDS ^[2]. Tuberculosis increases viral replication in people infected with HIV and accelerates the progression of the disease. Cameroon continues to be in a generalized epidemic situation characterized by an average prevalence of 3.4% in the 15-49 year old population. The prevalence of HIV in the general population has been declining since 2004, going from 5.5% in 2004 to 4.3% in 2011 and then to 3.4% in 2017. This downward trend is probably related to the improvement access to triple antiretroviral therapy (ARV) ^[3]. The interactions between TB and HIV are multiple and modify the epidemiology, clinical presentation and management of these diseases. Diagnosis of TB is difficult in co-infected people, they are more frequently asymptomatic than HIV-negative patients, and radiological abnormalities are less specific, including fewer cavity images. In addition, direct sputum examination is more frequently negative. The risk of developing active TB during latent infection depends on the degree of immunosuppression. Thus, ARVs play a major role in reducing the incidence of active TB by more than 90% ^[4]. The aim of this work was to research the epidemiological and radiological particularities of smear-positive tuberculosis patients in the era of triple antiretroviral therapy.

PATIENTS AND METHODS

We carried out a prospective, cross-sectional, descriptive and comparative study using a mixed, quantitative and qualitative approach, aiming to compare the epidemiological and radiographic aspects during pulmonary tuberculosis between the HIV positive patient on ARV treatment and the HIV negative patient. The study took place from December 1, 2018 to May 31, 2019 (6 months), at Jamot Hospital in Yaoundé (HJY). Indeed, the Jamot hospital is the reference center for the management of respiratory and

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psychiatric illnesses in Yaoundé and its surroundings.

Study population

The target population for the study were patients with smear-positive pulmonary tuberculosis (BPD +) diagnosed at the time of the survey.

Inclusion criteria

- Patients aged 18 and over;
- HIV positive patients on ARVs for at least 6 months and HIV negative patients;
- Patients who have had a standard chest x-ray.

Exclusion criteria

- Patients not consenting to participate in the study.
- Patients co-infected with HIV / BK who have stopped their ARV treatment.
- HIV / BK coinfected patients naïve to antiretroviral treatment.

DATA COLLECTION

A structured and pretext questionnaire was used for the collection of study data. This questionnaire was administered orally by 7th year medical students. The registers of the bacteriology laboratory were consulted for smear-positive tuberculosis patients. Once found, these patients were searched for in the various hospital wards. For the patients followed externally, they were recruited at the diagnostic and treatment center (CDT). The CDT is a compulsory registration center for all patients with non-multidrug-resistant tuberculosis before they are supplied with anti-tuberculosis drugs.

Eligible, informed and consenting patients were successively recruited and interviewed.

All chest x-rays were read by a radiologist. We performed non-probability and consecutive sampling. The study was carried out from December 1, 2018 to May 31, 2019.

The information collected was:

- Sociodemographic data: age, sex, marital status, level of education, professional status;
- Clinical data: medical history and risk factors (HIV infection, history of TB, arterial hypertension (hypertension), diabetes, alcohol and tobacco consumption); general and respiratory signs.
- The data of the chest x-ray.

Operational definition of the terms

Salaried worker: a person who carries out an activity or provides services under certain conditions and in exchange for remuneration.

Self-employed worker: person who carries out an economic activity on their own, bearing the risks of this activity and appropriating any profits that it can generate;

WHO Performance Status:

Score 0: capable of the same activity as before the disease.

Score 1: reduced physical activity but ambulatory and capable of carrying out work.

Score 2: ambulatory and able to take care of oneself. Unable to work and bedridden less than 50% of the time.

Score 3: capable of only a few activities. Bedridden or in a chair more than 50%.

Score 4: unable to take care of oneself. Bedridden or in a chair permanently.

Statistical analysis

The data were entered on Cs pro version 7.2. Analysis was performed using spss software version 23.0. Qualitative data was represented as numbers and frequencies. Quantitative data was represented by its mean and standard deviation. The comparison of the data was done by the Chi² test, while that of the quantitative data with the Student's T test. A p-value less than 0.05 was considered significant.

Ethical considerations

For the performance of this study, we obtained an ethical clearance from the ethics committee of the Faculty of Medicine and Pharmaceutical Sciences of Douala.

A recruitment authorization was obtained from the administrative authorities of the HJY before the start of the study. Oral informed consent was obtained from each study participant, for those under 21 parental consent was required.

The confidentiality and anonymity of each participant were respected for the personal data collected

RESULTS

From December 1, 2018 to May 31, 2019, we recruited patients aged 18 and over, hospitalized or outpatient for smear-positive pulmonary tuberculosis, in the pulmonology departments of the HJY and collected 145 cases. The estimated prevalence of smear-positive tuberculosis during this period is 18.23% at Jamot Hospital in Yaoundé. The HIV + group represented 43.4% of the study population.

Sociodemographic data

In the HIV + group, the mean age \pm standard deviation was 41.1 ± 12.4 years. The extreme ages were 18 and 84. In the HIV group, it was 39.8 ± 14.8 . The extreme ages were 21 and 84. Despite this high average age of HIV + patients, there was no statistically significant difference between the two groups. The 18-24 age group was less numerous among seropositive subjects [3.2% versus 18.5% ($p = 0.005$)]. Almost half of the HIV + patients were between 35 and 44 years old [49.5% versus 17.1%; ($P < 0.0001$)]. The male gender was more represented in both groups. However, the male sex was more represented in the seronegatives, ie [76.8% versus 50.8%; ($p = 0.01$)]. In fact, the proportion of men and women was almost identical in the HIV + group; the sex-ratio being 1.03 against 3.31 for the HIV group. The proportion of single people was lower in the HIV + group, ie [33.3% versus 50%. $P = 0.044$]. Patients who had reached secondary education level were more numerous in the HIV + group [61.9% versus 43.9% ($P = 0.032$)]. There is no statistically significant association between the occupational status of TB patients and HIV immunosuppression. $P > 0.05$.

Table 1: Epidemiological characteristics. Epidemiological and radiological particularities of smear-positive tuberculosis patients in the era of triple antiretroviral therapy at Jamot Hospital in Yaoundé, December 1, 2018 - May 31, 2019. HIV positive (N = 63), HIV negative (N = 82). Continuous variables are presented as mean ± standard deviation and categorical variables in numbers (proportion in%).

Variables	Modalities	HIV+	HIV-	P value
Average age in years		41.11 ±12.4	39.4 ± 14.8	0.482
Age Groups	[18-25]	2 (3.2)	15 (18.5)	0.005
	[25-35]	13 (20.6)	22 (26.8)	0.388
	[35-45]	31 (49.2)	14 (17.1)	<0.0001
	[45-55]	8 (12.7)	21 (25.6)	0.054
	[55-65] > 65	5 (7.9) 4 (6.3)	3 (3.7) 7(8.5)	0.294 0.757
Sex	Male	32(50.8)	63(76.8)	0.001
	female	31(49.2)	19 (23.2)	0.001
Marital Status	Single	21(33.3)	41(50.0)	0.044
	Married	23 (36.5)	26 (31.7)	0.545
	separated	2 (3.2)	1(1.2)	0.580
	Divorced	0	1(1.2)	1
	Widow(er)	4(6.3)	4 (4.9)	0.728
	Concubinage	13 (20.6)	9(11.0)	0.18
Level Of Study	unschooled	4(6.3)	12(14.6)	0.114
	Primary	9(14.3)	15(18.3)	0.520
	Secondary	39(61.9)	36(43.9)	0.032
	Superior	11(17.5)	19(23.2)	0.4
Professional Status	Employee	21(33.3)	30(36.5)	0.131
	Self-employed	18 (28.5)	24(29.2)	0.322
	Retirement	6 (9.5)	10(12.1)	0.415
	Student	3 (4.7)	3(3.6)	0.12
	Unemployed	15(23.8)	17(20.7)	0.251

Clinical data

Patients in the HIV + group had more history of tuberculosis [22.2% versus 9.8%; (p = 0.038)]; and had no registered hypertensive patients. They consumed less alcohol and tobacco; but the difference was not significant.

They were more likely to have a WHO performans status score 4 (unable to take care of themselves. Bedridden or in a chair permanently) [22.2% versus 4.9%; OR (CI) = 5.6 (1.73-17.9); P = 0.002].

HIV-patients more often had a score of 2 (outpatient and able to take care of oneself. Unable to work and bedridden less than 50% of the time) [63.4% versus 41.3; (P = 0.008)].

HIV + patients were more feverish than HIV- [96.8% versus 85.4% (p = 0.021)]. They reported more sputum (76.2% versus 73.2%) but the difference was not significant. The other clinical signs were more found in the HIV negative group. However, there was no statistically

significant association. It was a cough (100% versus 96.8%); hemoptysis (29.3% versus 19%); night sweats (81.7% versus 81%); chest pain (53.7% versus 42.9%) P> 0.05. All these data are summarized in Table II and III.

Table 2: Data on history and risk factors. Epidemiological and radiological particularities of smear-positive tuberculosis patients in the era of triple antiretroviral therapy at Jamot Hospital in Yaoundé, December 1, 2018 - May 31, 2019. HIV positive (N = 63), HIV negative (N = 82). Categorical variables are presented in numbers (proportion in%).

Variables	HIV +	HIV -	OR (ICà95%)	P Value
Diabetes	1(1.6)	5 (6.1)	0.25 (0.03 – 2.2)	0.233
High Blood Pressure	0	2 (2.4)	-	0.505
Alcohol	29 (46.0)	46 (56.1)	0.67 (0.35 – 1.3)	0.229
Tobacco	17 (27.0)	34 (41.5)	-	0.194
Tuberculosis	14 (22.2)	8 (9.8)	2.64 (1.03 - 6.77)	0.038

Table 3: Clinical features. Epidemiological and radiological particularities of smear-positive tuberculosis patients in the era of triple antiretroviral therapy at Jamot Hospital in Yaoundé, December 1, 2018 - May 31, 2019. HIV positive (N = 63), HIV negative (N = 82). Categorical variables are presented in numbers (proportion in%).

Signes cliniques		HIV+	HIV-	OR (IC à 95%)	Valeur p
General Condition Rating Index	SI	1 (1.6)	3 (3.7)	0.43 (0.043 – 4.2)	0.233
	SII	26 (41.3)	52 (63.4)	0.40 (0.21 – 0.8)	0.008
	SIII	22 (34.9)	23 (28.0)	1.34 (0.7 – 2.8)	0.375
	SIV	14 (22.2)	4 (4.9)	5.6 (1.73 – 17.9)	0.002
Fever		61 (96.8)	70 (85.4)	5.23 (1.13 – 24.3)	0.021
Night Sweats		51 (81.0)	67 (81.7)	0.95 (0.41 – 2.21)	0.908
Chest Pain		27 (42.9)	44 (53.7)	0.65 (0.33 – 1.26)	0.197
Hemoptysis		12 (19.0)	24 (29.3)	0.57 (0.26 – 1.25)	0.158
Expectoration		48 (76.2)	60 (73.2)	1.2 (0.55 – 2.5)	0.679
Cough		61 (96.8)	82 (100.0)	0.427 (0.4 – 0.52)	0.187

Radiological data

Normal radiography was more frequent in HIV + patients [34.9% versus 14.6% (P = 0.004)]

Radiographic particulars of the HIV positive patient.

Interstitial syndrome was the most common abnormality in both groups. HIV + patients had a lower risk of developing interstitial syndrome [(65.1% versus 85.4%; p = 0.004]. Alveolar syndrome was less present [19.0% versus 35.4%; (P = 0.031)]; same as bronchial syndrome, but the difference was not significant: p = 0.46 The most frequent syndromes were: cavitory, pleural and mediastinal syndrome, but the difference was not significant. > 0.05. All these data are summarized in Table IV.

Table 4: Radiological data Epidemiological and radiological particularities of smear-positive tuberculosis patients in the era of triple antiretroviral therapy at Jamot Hospital in Yaoundé, December 1, 2018 - May 31, 2019. HIV positive (N = 63), HIV negative (N = 82). Categorical variables are presented in numbers (proportion in%).

Syndromes Identified	HIV+	HIV-	OR(IC 95%)	P Value
Interstitial Syndrome	41 (65.1)	70 (85.4)	0.32 (0.14 – 0.71)	0.004
Cavitary Syndrome	21 (33.3)	21 (25.6)	0.7 (0.31-1.5)	0.35
Alveolar Syndrome	12 (19.0)	29 (35.4)	0.43 (0.2-0.93)	0.031
Pleural Syndrome	10 (15.9)	12 (14.6)	1.1 (0.44 – 2.74)	0.837
Mediastinal Syndrome	7 (11.1)	9 (11.0)	1.04 (0.36 – 2.9)	0.98
Bronchial Syndrome	4 (6.3)	8 (9.8)	0.63 (0.2 – 2.2)	0.46

DISCUSSION

This prospective, descriptive and analytical study took place in the pulmonology departments of the HJY from December 1, 2018 to May 31, 2019. It involved 145 patients, 63 of whom were co-infected with HIV / BK. The aim of our study was to describe and compare the epidemiological, clinical and radiological aspects of smear-positive pulmonary tuberculosis in HIV + patients on ARV and HIV -.

The frequency of HIV in this group of tuberculosis patients was 43.4%. Our results are superimposable on those of Cadelis in Guadeloupe [5] who found a frequency of 47% in 2012.

The frequency of tuberculosis would vary from one country to another, from one race to another. or even from one region to another because of the socio-cultural differences which govern the populations. Although the HIV + patients were on average 41.1 years \pm 12.4 years older compared to 39.8 years \pm 14.8 this difference was not statistically significant. Half of the seropositive patients (49.2%) were recruited between 35 and 44 years old. National data in Cameroon show a prevalence of 3.4% among the general population aged 15-49 years [3].

Our results are similar to those of Ondounda *et al.* in 2011 in Gabon [6]. The latter can be explained by the fact that this age group is more sexually active. It is also an age when most young people achieve some financial independence and would seek to make the most of the pleasures of life.

We had almost gender equality in the HIV positive group, the sex ratio there was 1.03. The HIV negative group had a more pronounced male predominance, with a sex ratio of 3.31. Our results differ from those of Ondounda *et al.* who found a sex ratio of 2 in HIV positive and 1.6 in HIV negative [6]. In Cameroon, household chores mean that women are less exposed to tuberculosis because of their temporary cutoff from the outside world. What is the opposite of men who are driven by economic activity to frequent large crowds. In addition, this near gender equality in the HIV + group confirms the trend towards feminization of the epidemic already described in Cameroon [3].

Singles were less represented among HIV + (33.3% versus 50%). These results are contrary to those found by Coulibaly *et al.* in Mali [7] who found a high prevalence of married couples in both groups. This can be explained by the fact that married couples use less protective measures than single people, notwithstanding the risks of infidelity. We recorded 15.2% of relapses of TB in the total population. Tekpa *et al.* were found 8.6% in the Democratic Republic of Congo [8]. Relapses of tuberculosis were more frequent in HIV positive patients (22.2% versus 9.8%). This frequency is lower (10.2% HIV +) than that found by Antoine *et al.* in France in 2012 [9]. These results can be explained by the fact that patients with a history of tuberculosis have a greater risk of developing tuberculosis due to reinfection or relapse when they have not had good adherence to treatment.

An WHO Performance Status: score of 4 and fever were more common in HIV positive patients on ARVs, and the difference was significant. Expectoration (76.2% versus 73.2%) was more frequent but the difference was not significant. Other respiratory and systemic symptoms were more common in HIV negative patients. In his series, Ka *et al.* reported that the most common symptoms were fever (86.6%) alteration of general condition (84.7%) and cough (75.0%). Less frequent, hemoptysis was reported in the proportions of 10 % [10].

CONCLUSION

Smear-positive pulmonary tuberculosis in HIV + patients on antiretrovirals affects both sexes in almost identical proportions. Often aged 35 to 44, with a history of tuberculosis. He has a WHO score of 4 and is generally feverish. The chest x-ray is often normal and less often presents the interstitial and alveolar syndromes.

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