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Factors Associated with Death among Tuberculosis Patients in Dakar

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Abstract

Introduction-Objective: Tuberculosis (TB) is the leading cause of death from a single infectious agent worldwide. The predictors of mortality due to TB are rarely evaluated in Senegal. The aim of our study was to identify factors associated with related TB death in two treatment centers in Dakar, Senegal. **Method:** We conducted a prospective descriptive-analytical study dealing with TB patients followed in the Department of Infectious and Tropical Diseases at FANN Teaching Hospital and Dakar Principal Hospital and in the Department of Pulmonology at Dakar Principal Hospital from March 1st, 2019 to February 29th, 2020. Univariate and multivariate logistic regressions were performed to identify the associated factors of death. **Results:** Two hundred eighty-two patients in the Department of Infectious and Tropical Diseases at FANN teaching hospital (57%), in the Department of Infectious and Tropical Diseases at Dakar Principal Hospital (31%), and in the Department of Pulmonology at Dakar Principal Hospital (12%) were included in the study. The mean age was 39 ± 16 years and the male to female ratio was 2.2. Isolated pulmonary TB, isolated extrapulmonary TB, and both pulmonary and extrapulmonary TB were present in 33.3%, 30.5% and 36.2% of cases, respectively. Twenty-two patients died, corresponding to a mortality rate of 7.8%. Factors independently associated with death were age ≥ 60 years (26.2 [3.6 - 191.2]) compared to 16 - 40 years' age group, HIV infection (7.2 [1.4 - 36.9]), neurological localization of TB (13.19 [3.2 - 54.3]), and hemoglobin level < 10 g/dl (5.5 [1.3 - 23.9]). **Conclusion:** Tuberculosis remains a fatal

disease despite therapeutic advances. Better knowledge of associated factors of death from TB may help to reduce its mortality.

Keywords

Tuberculosis, Death, Associated Factors, Dakar

1. Introduction

Tuberculosis (TB) is an infectious and chronic endemo-epidemic disease with human-to-human transmission through the respiratory tract with the organism *Mycobacterium tuberculosis*. It is a global public health issue, mainly in developing countries. According to the World Health Organization (WHO), the number of people infected with TB was around 10 million in 2018 [1] [2]. The annual incidence of tuberculosis varies widely from one country to another, ranging from less than 5 to 500 cases per 100,000 per year with an average of around 130 cases per 100,000 per year [2]. TB is among the top 10 causes of death in the world and the leading cause of death from a single infectious agent ranking above HIV/AIDS. In 2018 the number of people dying from TB was estimated at 1.2 million in those who are HIV negative and 251,000 in those co-infected with HIV. More than 95% of these deaths occur in medium or low-income countries [1] [2]. To deal with the high morbidity and mortality of TB, the WHO has adopted a response plan called "End TB" with the aims to reduce the incidence by 80% and death rate by 90% by the year 2030 [3]. Senegal is engaged in this strategy in the fight against this global public health issue. A National Health Plan against Tuberculosis (NHPT) was set up to reduce the morbi-mortality rate of TB. In this practical approach, the Senegalese authorities have created centers for early diagnose and treatment of TB to ensure testing and treatment of TB according to the national guidelines. Despite these important measures, in 2017, the NHPT reported an incidence of 122 new cases per 100,000. All categories of TB were included with a testing rate of 60% and a mortality rate up to 18 deaths per 100,000 [4]. Studies focusing on associated factors of deaths among patients infected with TB in Senegal are not very common, and they often deal with retrospective data and particular groups, such as HIV patients [5]. These are some of the reasons why we conducted this study to assess the different factors associated with death among patients infected with TB in two health care centers in Dakar.

2. Materials and Methods

2.1. Patients and Study Design

A prospective descriptive analytical study was conducted, covering the period from March 1st 2019 to February 29th 2020. Our study population included all patients treated for TB in the following centers: the Department of Infectious and Tropical Diseases of Dakar Principal Hospital, the Department of Pulmo-

nology of Dakar Principal Hospital, and the Department of Infectious and Tropical Diseases of FANN Teaching Hospital. All patients with bacteriologically confirmed or clinically diagnosed TB, who were at least 16 years of age, were included in the study. TB was confirmed by sputum smear microscopy for acid fast bacilli, Gene Xpert MTB/RIF essay, or Lowenstein Johnson medium culture of specimen. Patients unwilling to participate in the study or unavailable during the survey were not included. We excluded from the study the patients who were initially included without being bacteriologically confirmed in which late results of paraclinical investigations conclude to another disease than TB.

2.2. Data Collection

Data were collected from individual interviews with patients, medical records, and TB register of HNPT. After a literature review, a questionnaire was created and tested. Trained investigators were in charge to collect data, such as socio-demographic information (including age, gender, school attendance, level of education), date of hospitalization, department of hospitalization, medical backgrounds, lifestyle (including alcohol consumption, smoking status, marital status), clinical features, x-ray and laboratory data, TB disease categories, final TB diagnosis, number of hospital days, and treatment outcome (mainly focusing on mortality).

2.3. Study Definitions

Some operational definitions were adopted to facilitate data analysis. According to the site of the disease, three categories of TB were defined: isolated pulmonary tuberculosis (IPT) (only the lungs were affected), isolated extrapulmonary tuberculosis (IET) (sites other than the lungs were affected) or both (pulmonary and extrapulmonary TB infection). Long-term fever was defined as a fever that was evolving for at least one month. Hyperleukocytosis was defined as white blood cells count > 12,000 cells/mm^3, thrombocytopenia was defined as platelets count < 150,000 cells/mm^3, severe anemia was defined as a hemoglobin rate < 10 g/dl, and severe hyponatremia was defined as a serum sodium concentration < 130 mmol/L.

New TB cases were defined as patients who were diagnosed with TB and never received TB treatment before or had received TB treatment for less than 1 month. Relapse TB patients were defined as patients who were previously treated for TB, were declared cured or treatment completed at the end of their most recent course of TB treatment, and are now diagnosed with a recurrent episode of TB (either a true relapse or a new episode of TB caused by reinfection).

Patients restarting treatment were defined as those who have already received anti-TB drugs and have been lost to follow-up for 2 months or more and returned with evolving symptoms of TB.

2.4. Data Management and Statistical Analysis

Data were recorded in EPI INFO software (version 7.2.2.6), exported to Excel

(version 15.13.3), and analyzed using R software (version 3.4.1). According to their distribution, quantitative variables were represented using either means ± standard deviations (SD) or medians and their interquartile ranges (IQR). Qualitative variables were represented using frequency and percentages. After checking their distribution normality and the variances homogeneity, the means were compared using either Student's t-test or Wilcoxon Mann Whitney test. The proportions were compared using Pearson chi-squared test, Pearson's Chi-squared test with Yates' continuity correction, or Fisher's exact test. To identify the factors associated with death among TB patients, we performed a univariate logistic regression then a multivariate logistic regression to calculate the adjusted odds ratios (aOR) and their respective 95% confidence intervals (95% CI). All independent variables with a p-value < 0.2 in the univariate model were introduced in the multivariate model, and a backward stepwise method was used to generate the final model. Hosmer Lemeshow's adequation test and interactions checking between independent variables were used to validate the final model with p-value < 0.05. At the end of this procedure, the independent variables were significantly associated with death among TB patients when the CI 95% of their adjusted OR exclude the number of 1.

2.5. Ethical Considerations

Prior to the study, permission was obtained from the departmental heads at FANN and Dakar Principal Hospitals. Moreover, we obtained the consent of all the patients included in the study. Their confidentiality and anonymity were preserved, and adequate medical care and follow up were provided.

3. Results

During the study period, 282 patients infected with TB, all categories of TB, were enrolled and followed in the Department of Infectious and Tropical Diseases at FANN (57%), the Department of Infectious and Tropical Diseases at Dakar Principal Hospital (31%) and in the Department of Pulmonology at Dakar Principal Hospital (12%). There were 181 (64.2%) in-patients.

3.1. Descriptive Study

3.1.1. Epidemiological Characteristics

The epidemiological characteristics are represented in Table 1. The mean age was 39 ± 16 years old and the male to female ratio was 2.2.

3.1.2. Clinical Characteristics

The mean weight was 56 ± 11 kg with an average of Body Mass Index (BMI) of 18.6 ± 3.5 kg/m^2. The symptoms that were present are represented in Table 2.

3.1.3. Paraclinical Data

Chest x-rays were performed in 187 (66.3%) patients and showed abnormalities in 150 (80.2%). These abnormalities are represented in Figure 1.

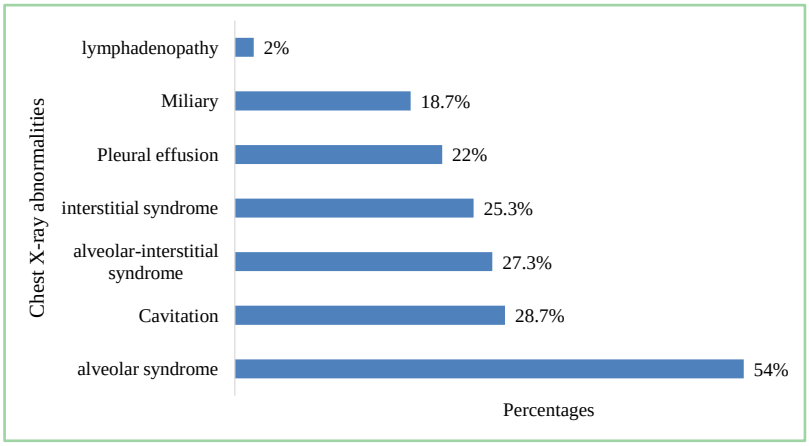

Figure 1. Distribution of TB patients according to their chest X-ray abnormalities in two health care centers in Dakar: 2019-2020 (N = 150).

Table 1. Distribution of TB patients according to their epidemiological characteristics in two anti-TB treatment centers in Dakar: 2019-2020 (N = 282).

Variable	Frequency (n)	*Percentages* (%)
Groups of age (years)		
[16 - 40[	157	*55.7*
[40 - 65[	88	*31.2*
≥65	37	*13.1*
Gender		
Male	194	*68.8*
Female	88	*31.2*
Marital status		
Married	143	*50.7*
Single	103	*36.5*
Divorced	23	*8.2*
Widowed	13	*4.6*
School attendance	203	*72*
Educational level		
Primary	57	*28.1*
Secondary	89	*43.8*
University	57	*28.1*
History of TB contact	73	*25.9*
History of TB	24	*8.5*
HIV-positive patients	80	*28.4*
High blood pressure	22	*7.8*
Diabetes	16	*5.7*
Chronic kidney disease	3	*1.1*
Smokers		
Current	23	*8.2*
Former	42	*14.9*
Alcohol consumption	35	*12.4*

Table 2. Distribution of TB patients according to the symptoms in two anti-TB treatment centers in Dakar: 2019-2020 (N = 282).

Symptoms	Frequency	*Percentages* (%)
Weight loss	259	*91.8*
Weakness	253	*89.7*
Loss of appetite	248	*87.9*
Long term fever	231	*81.9*
Coughing	185	*65.6*
Chest pain	124	*44*
Dyspnea	122	*43.3*
Headaches	84	*29.8*
Vomiting	77	*27.3*
Hemoptysis	25	*8.9*

Smear microscopy for acid fast bacilli and gene Xpert MTB/RIF essay of specimen were performed in 227 (80.5%) and in 60 (21.2%), respectively. The positivity rates were 80.5% for smear microscopy for acid fast bacilli and 66.7% for gene Xpert MTB/RIF essay. Lownstein Johnson medium culture was positive in 2 patients. The other laboratory results are represented in Table 3.

3.1.4. Categories of TB

Regarding the classification based on history of TB treatment, there were 257 (91.1%) new TB cases, 24 (8.5%) relapse cases, and 1 case of restarting TB treatment. Bacteriological evidence of TB was found in 147 (52.1%). According to the sites of TB, 93 (33.3%) had IPT, 86 (30.5%) had IET, and both pulmonary and extrapulmonary TB infections were present in 102 (36.2%). The main extrapulmonary localizations are represented in Figure 2.

3.1.5. Evolutive Data

Median duration of hospitalization was 17 days (IQT: 9 - 22 days). Of those enrolled in the study, 11 (3.9%) had complications, such as thromboembolic disease (9), *Klebsiella pneumoniae* bacteremia (1) and neurocognitive disorders (1), during their follow up. Twenty-two (22) out of 282 patients died corresponding to mortality rate of 7.8%.

3.2. Analytical Study

3.2.1. Univariate Analysis

1) Epidemiological factors

In univariate analysis, epidemiological factors significantly associated with death were advanced age ($p = 0.003$), widowed marital status ($p = 0.001$) and HIV infection status ($p < 0.001$) (see Table 4).

2) Clinical factors

In univariate analysis, IPT was a protective factor (p = 0.04) and divided the the probability of death by 3. However, the presence of both pulmonary and extra-pulmonary TB (p = 0.005) and neurological localization of TB (p < 0.001) were significantly associated with deaths (see Table 5).

3) Paraclinical factors

In the univariate analysis, biological abnormalities significantly associated with deaths were severe anemia (p < 0.001), hyperleukocytosis (p = 0.009), and severe hyponatremia (p = 0.02) (see Table 6).

3.2.2. Multivariate Logistic Regression

After adjustment for potential confounding factors, advanced age, co-infection with HIV, neurological localization of TB and severe anemia were independently associated with death (see Table 7). Probability of death was 26 times higher in patients over the age 60 than in patients between 16 to 40. The probability was 7 times higher in HIV positive patients than in HIV negative patients, and it was 13 times higher in patients who had neurological TB localization. Patients who had severe anemia were 5 times more likely to die.

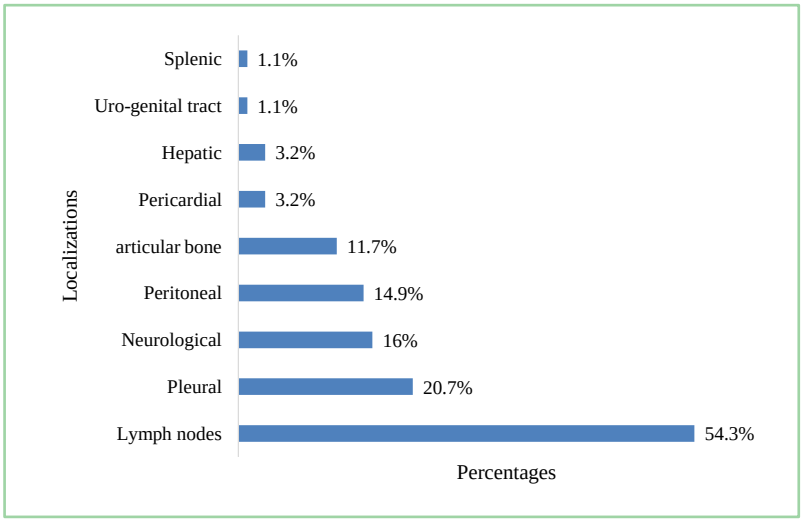

Figure 2. Distribution of TB patients according to the extrapulmonary TB localizations in two anti-TB treatment centers in Dakar: 2019-2020 (N = 188).

Table 3. Distribution of TB patients according to laboratory results in two anti-TB treatment centers in Dakar: 2019-2020 (N = 282).

Laboratory data	Mean	*Standard deviation*
White blood cells count (cells/mm^3)	7827	*4199*
Hemoglobin (g/dl)	10.5	*2.3*
Platelets count (cells/mm^3)	377,679	*260,288*
C-reactive Protein (mg/l)	118.1	*66.3*
Natremia (mEq/l)	133.4	*4.3*
ALT (IU/l)	41.2	*47.7*

Table 4. Distribution of deaths in TB patients according to their epidemiological characteristics in two anti-TB treatment centers in Dakar: 2019-2020 (N = 282).

Variables	Death		p
	Yes n (%)	No n (%)	
Age groups (years)			
[16 - 40[	6 (3.8)	151 (96.2)	-
[40 - 60[	9 (10.2)	79 (89.8)	0.05
≥60	7 (18.9)	30 (81.1)	0.003
Gender			
Male	13 (6.7)	181 (93.3)	0.34
Female	9 (10.2)	79 (89.8))	
Marital status			
Singles	3 (2.9)	100 (97.1)	-
Divorced	2 (8.7)	21 (91.3)	0.22
Married	13 (9.1)	130 (90.9)	0.06
Widows	4 (30.8)	9 (69.2)	0.001
School attendance			
Yes	13 (6.4)	190 (93.6)	0.24
No	9 (11.4)	70 (88.6)	
HIV infection			
Yes	14 (17.3)	67 (82.7)	<0.001
No	8 (4)	193 (96)	
History of tuberculosis contact			
Yes	3 (4.1)	70 (95.9)	0.26
No	19 (9.1)	190 (90.1)	
History of tuberculosis			
Yes	2 (8.3)	22 (91.3)	1
No	20 (7.8)	238 (92.2)	
High Blood Pressure			
Yes	1 (4.5%)	21 (95.5%)	1
No	21 (8.1%)	239 (91.9%)	
Diabetes			
Yes	3 (18.8%)	13 (81.2%)	0.12
No	19 (7.1%)	247 (92.9%)	
Smoking statues			
Never	18 (8.3)	199 (91.7)	-
Active	2 (9.1)	21 (90.9)	0.90
Former	2 (4.8)	40 (95.2)	0.44
Alcohol consumption			
Yes	0 (0)	35 (100)	0.09
No	22 (8.9)	225 (91.1)	

Table 5. Distribution of deaths in TB patients according to their clinical forms in two anti-TB treatment centers in Dakar: 2019-2020 (N = 282).

Clinical forms	Death		p
	Yes N (%)	No N (%)	
Final diagnosis			
New TB cases	20 (7.8)	237 (92.2)	-
Relapse TB cases	2 (8.3)	22 (91.7)	0.9
Restart of TB treatment	0 (0)	1 (100)	0.9
Isolate pulmonary TB			
Yes	3 (3.2)	90 (96.8)	0.04
No	19 (10.1)	170 (89.9)	
Isolated extra pulmonary TB			
Yes	5 (5.8)	81 (94.2)	0.4
No	17 (8.7)	179 (91.3)	
IPT and IET			
Yes	14 (13.6)	89 (86.4)	0.005
No	8 (4.5)	171 (95.5)	
Neurological localization			
Yes	9 (31)	20 (69)	<0.001
No	13 (5.1)	240 (94.9)	
Pericardial localization			
Yes	1 (16.7)	5 (83.3)	0.39
No	21 (7.6)	255 (92.4)	
Lymph node localization			
Yes	8 (7.8)	94 (92.2)	0.98
No	14 (7.8)	166 (92.2)	
Pleural localization			
Yes	2 (6.1)	31 (83.9)	1
No	20 (8)	229 (92)	
Uro-genital localization			
Yes	1 (50%)	1 (50%)	0.15
No	21 (7.5%)	259 (86%)	
Peritoneal localization			
Yes	4 (13.3)	26 (89.3)	0.47
No	19 (7.1)	235 (92.9)	

Table 6. Distribution of deaths in TB patients according to their paraclinical results in two anti-TB treatment centers in Dakar: 2019-2020 (N = 282).

Paraclinical data	Death		p
	Yes n (%)	No n (%)	
Chest X-ray			
Normal	3 (8.1)	34 (91.9)	-
Abnormal	14 (9.3)	136 (90.7)	0.81
Not done	5 (5.3)	90 (94.7)	0.54
Microscopy for acid fast bacilli			
Negative	8 (7.5)	99 (92.5)	-
Positive	7 (5.8)	113 (94.2)	0.62
Not done	7 (12.7)	48 (87.3)	0.28
Gen Xpert			
Negative	1 (5)	19 (95)	-
Positive	5 (12.5)	35 (12.5)	0.37
Not done	16 (7.2)	206 (92.8)	0.71
Hyperleukocytosis			
Yes	6 (23.1)	20 (76.9)	0.009
No	16 (6.2)	240 (93.8	
Severe anemia			
Yes	16 (16.5)	81 (83.5)	<0.001
No	6 (3.2)	179 (96.8)	
Thrombocytopenia			
Yes	3 (17.6)	14 (82.4)	0.14
No	19 (7.2)	246 (92.8)	
CRP > 24 mg/l			
Yes	19 (7.3)	240 (92.7)	0.4
No	3 (13)	20 (87)	
Severe hyponatremia			
Yes	7 (18.4)	31 (81.6)	0.02
No	15 (6.1)	129 (93.9)	
ALT > 45 IU/l			
Yes	3 (3.4)	85 (96.6)	0.11
No	19 (9.8)	175 (90.2)	

Table 7. Logistic regression assessing the associated factors with deaths in TB patients in two anti-TB treatment centers in Dakar: 2019-2020 (N = 282).

Variables		Univariate		Multivariate	
		OR [95% CI]	p	aOR [95% CI]	p
Age groups (Years)	[16 - 40[	1			
	[40 - 60[	3.3 [0.9 - 11.7]	0.0 5	1.1 [0.2 - 5.3]	0.90
	≥60	7.55 [2.0 - 28.3]	0.003	26.2 [3.6 - 191.2]	0.001
Sex	Female	1			
	Male	0.8 [0.3-2.2]	0.6	1.01 [0.3 - 4.1]	0.98
HIV infection	No	1			
	Yes	9.55 [3.0 - 30.3]	<0.001	7.2 [1.4 - 36.9]	0.02
Neurological localization	No	1			
	Yes	13.5 [4.7 - 38.8]	<0.001	13.2 [3.2 - 54.3]	<0.001
Hyperleukocytosis	No	1			
	Yes	2.6 [0.6 - 9.7]	0.15	2.4[0.5 - 12.6]	0.28
Severe anemia	No	1			
	Yes	7.2 [2.3 - 22.7]	<0.001	5.5 [1.3 - 23.9]	0.02
Platelets (cells/mm^3)		0.9 [0.9 - 0.99]	0.004	0.99 [0.9 - 1]	0.0 5

AIC = 91.

4. Discussion

During a one-year period, we followed 282 TB patients in three TB treatment centers in Dakar, which are in accordance with the national TB guidelines. The mortality rate was 7.8%. All the potential explaining variables that were within our reach were taken into account in our analysis. Factors identified to be significantly associated with death after a multivariate analysis was: advanced age, HIV positive status, neurological localization of the TB, and severe anemia.

4.1. The Mortality Rate

The mortality rate (7.8%) in our study is lower than the ones found in Africa and in Senegal in 2018 (25% and 16%, respectively) [2]. This mortality rate is also lower than the mortality rates found by Fortes Déguénonvo et al in Senegal in 2014 (31%) [6], Diallo et al in Guinea Conakry in 2015 (14%) [7] and Ade S et al in Benin in 2015 (12%) [8]. However, it was higher than the one found by Diop M et al in Thies (Senegal) in 2014 (5.5%) [9]. These differences may be related to the improvement of health care strategies and medical advances, medical facility differences from one health care center to another, and differences in the selection of study populations. The racial disparity of study populations in different countries in terms of sociocultural characteristics, TB exposure level, health care access may also explain these differences.

4.2. Associated Factors with Death

4.2.1. Advanced Age

In our study, patients older than 60 years of age were 26 times more likely to die compared to patients who were between 16 to 40. The link between advanced age with death is noted in almost all studies assessing risk factors of death among TB patients [10] [11] [12]. This association may be explained by the decrease of the immune system with advancing age and the occurrence of other fatal diseases related to advanced age. Rare studies have focused their analysis on the standardization of mortality in age groups and showed a significant increase of death in young patients [13].

4.2.2. HIV Infection Status

Our study shows that the probability of death was 7 times higher in HIV positive patients than in HIV negative patients. This finding is in line with results of many other authors such as Ohene SA et al in Accra (Ghana) [10] and Qian X et al in Texas [14]. Similar to advanced age, the association of HIV infection with death among TB patients may be due to the weakened immune system caused by HIV, decreasing the strength to fight against TB. This increased probability may also be due to other serious opportunistic infections associated with HIV that may contribute to the high mortality among HIV positive patients.

4.2.3. Neurological Localization of TB

The neurological localization of TB appeared to be independently associated with mortality in our study with an adjusted OR of 13.2 and a CI 95% of [3.2 - 54.3]. This result is similar to the findings of Ohene SA et al in Accra (Ghana), which showed a significant association between neurological localization of TB and death with an adjusted OR of 3.9 a CI 95% of [1.1 - 13.2] [10]. In Senegal, a study dealing with patients infected both by tuberculosis and HIV showed a significant relationship between neurological localization of TB and death ($p < 0,001$) [5]. Mechanic, vascular, inflammatory, and metabolic injuries caused by Koch's bacillus on the central nervous system makes this form of TB particularly serious and may contribute to an early death. Moreover, the difficulty in diagnosing neurological form of TB can contribute to late treatment onset and may explain frequent unexpected deaths of some patients.

4.2.4. Severe Anemia

TB patients who had severe anemia in our study had increased mortality rate compared to TB patients who did not (adjusted OR = 5.52; CI 95% [1.28 - 23.86]). This finding is consistent with those reported by a Russian study, which underlined that patients with anemia were 5 times more at risk to die compared to patients with normal hemoglobin level [15]. The same association was identified by Mugusi FM et al in Tanzania. They showed that a low hemoglobin rate was a predictor factor of death among TB patients (adjusted OR = 0.73; CI 95% [0.67, 0.80]) [16]. This association may be explained by the fact that anemia, mainly due to chronic inflammation from TB infection, increases vital organ

failures such as heart, kidneys, or brain and contributes to mortality.

Some researchers have found other associated factors of deaths among TB patients such as female gender [17], low level of education [18], general ill health [16], and positivity or negativity of smear microscopy for acid fast bacilli [19] [20]. All these independent variables were taken into account in our analysis but did not appear to be significantly associated with mortality. These differences may be due to differences in study design, sample size, or study populations.

4.3. Limitations of the Study

Despite the results which are globally in line with those found in the literature, our study has some limitations. The first one link with the fact that the study dealt mainly with in-patients. This does not allow statistical inference to the general population. The second one is related to the relatively low sample size that may impact the strength of the study. The third one is that we could not take into account some factors, such as patients' economical status, their access to healthcare centers, their social and cultural characteristics, which have been significantly associated with deaths among TB patients in some studies [21] [22] [23]. Additionally, we were not able to clearly define the duration of the evolution of the symptoms among all patients, which may impact the treatment outcome [24].

5. Conclusion

This prospective study shows a lower mortality rate than what was recently estimated in Africa and Senegal. It also presents a number of factors, such as advanced age, HIV infection status, neurological localization of TB, and severe anemia that increase mortality rate among TB patients. Knowledge of these associated factors by physicians could improve the management of TB patients and reduce TB-related mortality. This may contribute to reaching the goals of "End TB" strategy by 2030.

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Conflicts of Interest

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

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Appendix

CRF

1) SOCIO-DEMOGRAPHIC DATA

Patient Code: |___|___|___|___|___|___| **Day of admission:** |___|___|___

In-patient: Yes ❑ No ❑

Department: DITD*/DPH** ❑ DITD/FANN HOSPITAL ❑
PULMONOLOGY/DPH ❑

Initial of first Name |___|___|___| **Initial of second Name** |___|___|___|

Address: _____

Sex: _____ **Age:** |___|___| years

Profession: _____

Marital status: Single ❑ Married ❑ Divorced ❑ Widowed ❑

School attendance: Yes ❑ No ❑

Educational level: Primary ❑ Secondary ❑ University ❑

2) BACKGROUNDS-LIFESTYLE

➢ **Backgrounds**

TB contact: Yes ❑ No ❑ **History of TB:** Yes ❑ No ❑

High blood pressure: Yes ❑ No ❑ **Diabetes:** Yes ❑ No ❑

HIV: Yes ❑ No ❑ **Others:** Yes ❑ No ❑ if others, precise: _____

➢ **Lifestyle**

Alcohol consumption: Yes ❑ No ❑

Smoking: No ❑ Former smoker ❑ current smoker ❑

3) CLINICAL DATA

➢ **Functional signs:**

The beginning of symptoms: |___|___|___| (days or months)

Coughing: Yes ❑ No ❑ **Chest pain:** Yes ❑ No ❑

Dyspnea: Yes ❑ No ❑ **Vomiting:** Yes ❑ No ❑

Headaches: Yes ❑ No ❑ **Hemoptysis**: Yes ❑ No ❑

Others: Yes ❑ No ❑ If others, precise_____

➢ **Vital signs:**

Temperature: |___|___|.|___| **Weight:** |___|___|___| kg **Size:** |___|.|___|___| m

Blood Pressure: |___|___|___|/|___|___|___| mm Hg

Respiratory rate: |___|___|___| c/min

Pulse: |___|___|___|

➢ **General signs:**

Long term fiver: Yes ❑ No ❑

Weight loss: Yes ❑ No ❑

Weakness: Yes ❑ No ❑

Loss of appetite: Yes ❑ No ❑

➢ **Examination:**

pulmonary condensation: Yes ❑ No ❑

lymphadenopathy: Yes ❑ No ❑ if yes, **Localization**: _____

Pleurisy: Yes ❑ No ❑

Pneumothorax: Yes ❑ No ❑
meningeal syndrome: Yes ❑ No ❑
Other neurological signs: Yes ❑ No ❑ if yes, precise: _____
Ascites: Yes ❑ No ❑
Other signs: Yes ❑ No ❑ If yes, precise: _____

4) PARACLINICAL INVESTIGATIONS

➢ **Bacteriological investigations**

Smear microscopy done: Yes ❑ No ❑
Results of Smear microscopy: positive ❑ Negative ❑
Specimen: Gastric lavage: Yes ❑ No ❑
Smear: Yes ❑ No ❑
Urines: Yes ❑ No ❑
Lymph node puncture: Yes ❑ No ❑
Broncho-alveolar lavage fluid: Yes ❑ No ❑
Others: Yes ❑ No ❑
If yes, precise_____
Gen Xpert done: Yes ❑ No ❑
Results: positive ❑ negative ❑
Specimen: Gastric lavage: Yes ❑ No ❑
Smear: Yes ❑ No ❑
Urines: Yes ❑ No ❑
Lymph node puncture: Yes ❑ No ❑
Broncho-alveolar lavage fluid: Yes ❑ No ❑
Others: Yes ❑ No ❑
If yes, precise_____

➢ **Cells blood Count**

Hemoglobin rate: |___|___|.|___| g/dl
Mean corpuscular volume: |___|___|___|.|___|fl
White blood cells: |___|___|___|___|___|/mm^3
Red blood cells: |___|___|___|___|___|/mm^3
Platelets: |___|___|___|___|___|___|/ml
Lymphocytes: |___|___|___|___|___|/mm^3
Neutrophils: |___|___|___|___|___|/µL

➢ **Blood biochemistry**

AST: |___|___|___|. |___| IU/l ALT: |___|___|___|. |___| IU/l
Bili_T: |___|___|___|. |___| UI/l Bili_C: |___|___|___|. |___| UI/l
PAL: |___|___|___|. |___| UI/l Gamma_GT: |___|___|___|. |___| UI/l
Serum creatinine level: |___|___|___|. |___| mg/l, Azotemia: |___|.|___| g/l
Capillary blood sugar: |___|.|___| g/l, Natremia |___|___|___|.|___|
Kaliemia|___|.|___|
CD4 count: |___|___|___|___| CRP: |___|___|___|. |___|

➢ **Chest X-ray:** Normal ❑ Abnormal ❑ Not done ❑

Precise abnormalities: alveolar sd ❑ interstitial sd ❑

alveolointertitial sd ❑ pleural infusion ❑
miliary ❑ cavitation ❑
pneumothorax ❑ lymphadenopathies ❑ other signs ❑, precise___

➢ **Chest CT scan:** Normal ❑ Abnormal ❑ Not done ❑

Precise abnormalities: alveolar sd ❑ interstitial sd ❑ alveolointertitial sd ❑
pleural infusion ❑ miliary ❑ cavitation ❑
pneumothorax ❑ lymphadenopathies ❑
other signs ❑ if yes, precise _____

➢ **Abdominal CT scan:** Normal ❑ Abnormal ❑ Not done ❑

Precise abnormalities: Lymphadenopathy ❑ Ascites ❑
Other signs: ❑, If other signs Precise: _____

5) TB CLASSIFICATIONS

Final diagnosis: New case ❑ relapse case ❑ treatment re-starting case ❑
TB categories: IPT ❑ IET ❑ Pulmonary + extrapulmonary TB ❑
Extrapulmonary localizations:
pleural ❑ splenic ❑
pericardial ❑ peritoneal ❑
lymph node ❑ neurological ❑
articular bone ❑ urogenital tract ❑
hepatic ❑
Other localizations ❑ if other localizations, precise_____
Confirmed TB: Yes ❑ No ❑
If yes: by microcopy ❑ by Gen Xpert ❑ by culture ❑

6) TREATMENT DATA

✓ **Anti-TB drugs:**
Date de of starting: |___|___|/|___|___|/|___|___|___|___|
Treatment regimen: _____
Number of tablets: |___|

✓ **OTHER TREATMENT:**

_____

7) EVOLUTION DATA

Hospital stay days: |___|___|___| (days)
Control after one month of treatment (M1)
Smear microcopy: Done ❑ Not done ❑. **Results:** Positive ❑ Negative ❑
Control after 5 month of treatment
Smear microcopy: Done ❑ Not done ❑. **Results:** Positive ❑ Negative ❑
Treatment outcomes: Success ❑ Failure ❑ loss of follow-up ❑ Dead ❑
Transferred ❑

_____

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