

Factors Associated with Depression in Tuberculosis Patients in Senegal

Mbayang Ndiaye¹, Aurelie Zohra Betty Tessy², Mamadou Makhtar Mbacke Leye², Ibrahima Seck²

¹Psychiatry Department, Ouakam Military Hospital, Dakar, Senegal

²Department of Preventive Medicine and Public Health, Cheikh Anta Diop University, Dakar, Senegal

Email address:

djibambayang@gmail.com (Mbayang Ndiaye)

To cite this article:

Mbayang Ndiaye, Aurelie Zohra Betty Tessy, Mamadou Makhtar Mbacke Leye, Ibrahima Seck. Factors Associated with Depression in Tuberculosis Patients in Senegal. *Central African Journal of Public Health*. Vol. 8, No. 6, 2022, pp. 217-222.

doi: 10.11648/j.cajph.20220806.11

Received: October 16, 2022; **Accepted:** October 31, 2022; **Published:** November 10, 2022

Abstract: *Background:* Depression is a psychiatric pathology. This study aims to determine the prevalence and depression-associated factors in patients with tuberculosis. *Methodology:* A descriptive and analytical cross-sectional study was conducted from April 30th, 2021 to October 30th, 2021. A questionnaire including sociodemographic and clinical characteristics, illness experience and the PHQ-9 scale was used to collect the data. A multivariate analysis was carried out using the R software. All the variables whose p values were less than 0.25 were taken into account. Then, by a top-down procedure, the least significant variables were removed one by one, and the comparison was the likelihood ratio test. *Results:* A total of 109 patients were surveyed. The average age of the respondents was 33.6 ± 12.6 years. The majority, 61.5% of the patients, was single. In our study, 37% of individuals had a PHQ-9 score between 5 and 9, which classified them as mild depression. A 6.10 times higher risk (OR_{adj}= 6.10 [1.55-29.0]) of developing mild depression was found in patients with a chronic pathology (diabetes, HBP). Patients with a number of crosses higher than or equal to 3 had a 13.1 times greater risk of being depressed (OR_{adj}= 13.1 [3.90-63.5]). *Conclusion:* Tuberculosis remains a major public health problem. This study allowed us to highlight the occurrence of depression in people with tuberculosis and the need to integrate a systematically psychological assessment in these people.

Keywords: Tuberculosis, Depression, Senegal

1. Introduction

Tuberculosis is an infectious, endemo-epidemic disease. It remains, by its extent and seriousness, a major public health problem despite several strategic control plans put in place by the health authorities.

Globally, there was a sharp global decline in the number of people newly diagnosed with TB and reported. This number had fallen from 7.1 million in 2019 to 5.8 million in 2020, which represented an 18% drop. However, the COVID-19 pandemic has led to a decline in the supply of essential TB services. About 10 million people developed tuberculosis in 2020. The number of deaths is estimated at 1.3 million compared to 1.2 million in 2019 [1, 2]. Africa accounted for 24% of the global disease burden in 2018, or 2,400,000 new cases. The most affected countries were Nigeria and South Africa with 4% and 3% of cases respectively [1].

In Senegal, according to WHO estimates, TB incidence was 117 per 100,000 inhabitants in 2020. In 2019, 13,744 cases of tuberculosis were identified in the country, representing a notification rate of 86 cases/100,000 inhabitants [3].

In addition to its somatic repercussions on the organism of the individual, tuberculosis leads to psychic manifestations. It is often associated with depression which is the leading cause of morbidity and disability worldwide. According to the latest estimates from the World Health Organization (WHO), more than 300 million people worldwide live with this problem [4]. It is reported that 3.8% of the population is affected, including 5.0% of adults and 5.7% of people over the age of 60. This pathology is to be discerned from mood swings and temporary emotional reactions to everyday problems. When it is recurrent and of moderate or severe intensity, depression can become a serious illness. It can cause great

suffering and alter the professional, school and family life of the person affected. In the worst case, depression can lead to suicide. More than 700,000 people die by suicide each year. Suicide is the fourth leading cause of death among 15-29 year olds [5].

The interest of this study is to better understand the onset of depression in patients with tuberculosis. In addition, this will allow us to make recommendations to the national tuberculosis control program on the need for multidisciplinary management of these patients.

The objective of this study was to assess the prevalence and determine depression-associated factors in tubercular patients.

1.1. Study Framework

Our study took place at the Gaspard Kamara health center in the central district of Dakar in Senegal. It is located in the

district of Plateau and in the district township of Fann-Point E-Amitié. It focuses on the following neighborhoods: SICAP Rue 10, Point E, Fann Résidence, Fann Hock, Amitié 1 and 2 and covers an estimated population of 376,745 inhabitants in 2018 [6]. The offer of services is continuous (every day 24 hours a day) in general service, permanence, guard. As for the care of patients diagnosed with tuberculosis, it is provided by two social workers and a nurse's aid. The latter are responsible for dispensing medicines to patients, social support, home visits for family awareness, therapeutic education and referral to a doctor.

With regard to the psychological care of patients, social workers are responsible for providing social support with the aim of facilitating acceptance of the disease and avoiding social isolation. In some cases, they may need to refer the patient to a specialist.

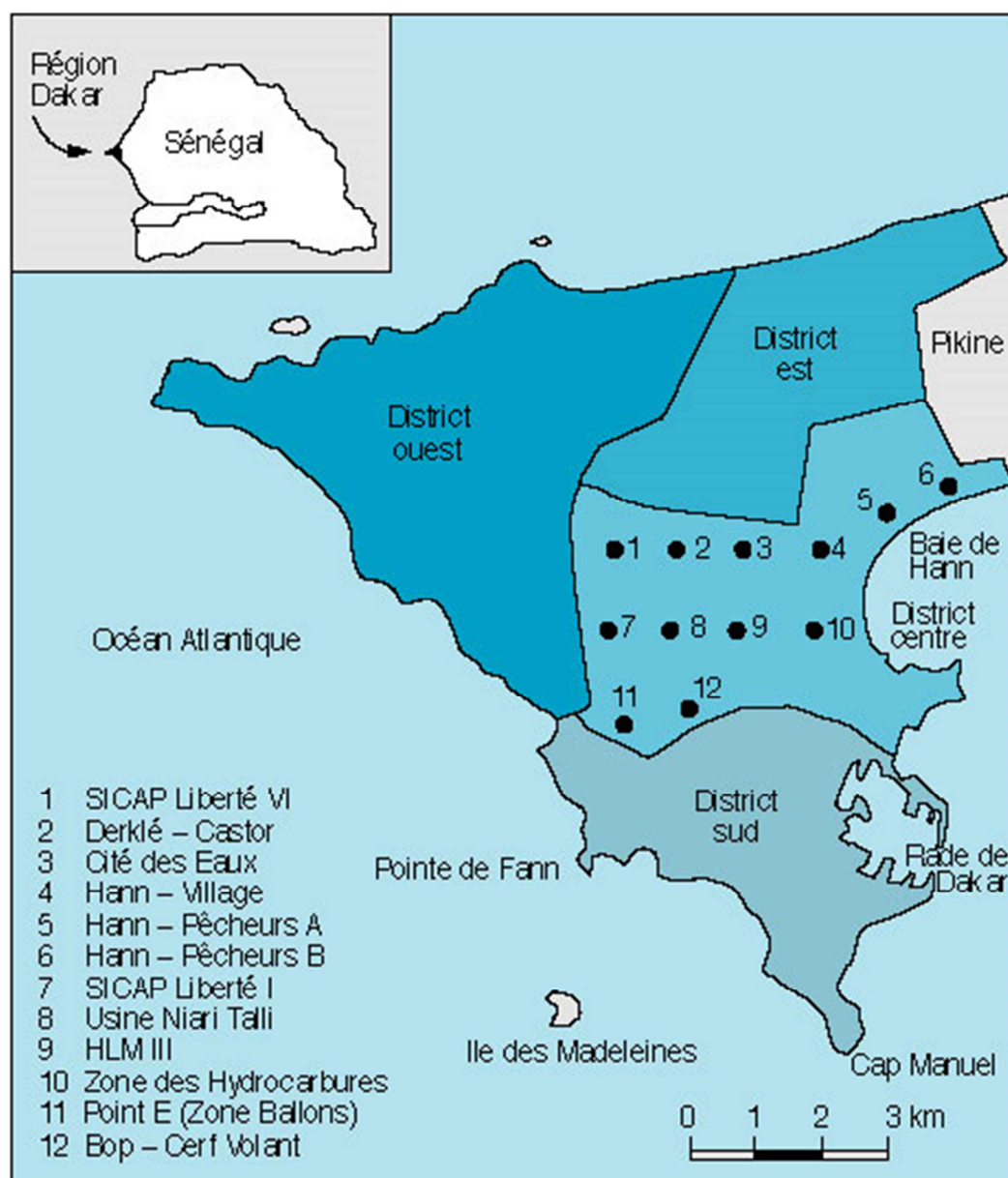


Figure 1. Map of the Dakar Center health district.

1.2. Tuberculosis Data

Table 1 Declaration of tuberculosis cases by quarter in 2020.

Period	Pulmonary tuberculosis						TEP	Total
	Bacteriologically confirmed (BCPT)				Clinically diagnosed			
	New cases	Relapses	Failures	Resumptions of TTT	<15 years	15 years &+		
T1	124	8	2	1	2	2	23	162
T2	74	12	5	0	0	1	17	109
T3	96	4	3	0	0	1	22	126
T4	98	4	1	0	1	1	34	139
Total	392	28	11	1	3	5	96	536

2. Methodology

2.1. Type and Period of Study

This was a descriptive and analytical cross-sectional study, conducted from April 30th, 2021 to October 30th, 2021.

2.2. Study Population

The study population was represented by all tuberculosis patients who started their treatment between January 1st and June 1st, 2021 at the Gaspard Kamara health center.

2.3. Sampling Method

An exhaustive recruitment was carried out. All patients diagnosed with tuberculosis under treatment aged 16 to 70 years were included in the study. Patients with a known psychiatric disorder, as well as those who refused to participate in the study, were not included.

2.4. Data Collection Tool and Technique

The data was collected from June 15th to 30th, 2021, at the Gaspard Kamara health center using a questionnaire that focused on sociodemographic characteristics, experience of the disease and PHQ-9.

Regarding the PHQ-9, it is a brief scale made up of 9 items and the patient is asked to answer it with these 4 response options: "not at all", "several days", "more than half days" and "almost every day". The rating assigned to each answer is respectively 0, 1, 2, 3, 4. The maximum score is 27.

The diagnostic thresholds for the severity of depression were:

- 1) Absence of depression: 0-4 points;
- 2) Mild depression: 5-9 points;
- 3) Moderate depression: 10-14 points;
- 4) Moderately severe depression: 15-19 points;
- 5) Severe depression: 20-27 points.

2.5. Data Entry and Analysis

Data were entered using Epi info software. The analysis was done using R 4.0.2 software. It had two parts: descriptive and analytical.

The description of the quantitative variables was done with the calculation of the averages with their standard deviations and that of the qualitative variables with their absolute and

relative frequencies. The results were represented in the form of diagrams and tables.

A multivariate analysis was also performed. For the modeling of the dependent variable the level of depression, the development of the model was done following the approach described by Hosmer and Lemeshow [7]. All variables whose p were less than 0.25 (Greenland, 1989) in the bivariate analyses were candidates for the final model. Then, by a top-down procedure, the least significant variables were removed one by one, and the comparison was the likelihood ratio test.

2.6. Validity of the Study

Cross-sectional epidemiological studies are often subject to biases that can threaten internal and external validity. This is how provisions have been made to minimize biases and confounding factors.

2.6.1. Selection Bias

The exhaustive recruitment allowed individuals to have the same probabilities of inclusion in the study. People who, in person, did not come to pick up their medication were phoned for the administration of the questionnaire.

2.6.2. Information Bias

The questionnaire was administered in the local language.

2.6.3. Confounding Factors

Multivariate analysis was used to take into account confounding factors.

3. Results

3.1. Socio-Demographic Characteristics

At the end of our recruitment we collected 109 patients who were enrolled, the majority of participants were men (68.8%) or a sex ratio of 2.2 in favor of men. The average age of patients was 33.6 ± 12.6 years with extremes of 16 to 74 years. The median was 30 years. The most represented age group was 25-35 years with a proportion of 31.2%. Single people were in the majority (61.5%) and married people represented 35.8%. The secondary or higher level was more found with 57.8% of cases.

3.2. Socio-Economic Characteristics

Patients with salaried occupation represented 66.1% and

50 of them, or 69.4%, worked in the informal sector. The average salary was CFA 92,217 \pm 49,220 with extremes ranging from CFA 21,000 to 200,000.

3.3. Clinical Characteristics

The average duration of treatment was 2.6 \pm 1.2 months and the 2 month stage represented nearly 29.4% of cases. Pulmonary localization was much more frequent with a proportion of 89% of individuals. More than half of the patients had 3 crosses on the smear before treatment, or a proportion of 60.8%.

In our study, 10.1% of patients were hospitalized. Fourteen (14) patients had a chronic disease, a proportion of 12.8%. Patients who stopped working represented 73.4% of respondents and 12.8% suffered discrimination within their family.

3.4. Prevalence of Depression

Eighty (80) patients or 73% had no depression and 37% had mild depression.

Factors associated with depression in patients with tuberculosis

3.5. Multivariate Analysis

Patients with chronic disease were 6.10 (95% CI = 1.55-29.0) times more likely to have mild depression. Those with more than 3 crosses on the smear before treatment were 13.1 (95% CI = 3.90-63.5) times more likely to have mild depression.

Table 2. Factors associated with mild depression.

Characteristic	OR ¹	95% CI ¹	p-value
Chronic disease			
No	—	—	
Yes	6.10	[1.55-29.0]	0.014
Discrimination			
No	—	—	
Yes	1.84	[0.42 – 7.98]	0.4
Number of crosses			
<3	—	—	
≥ 3	13.1	[3.90-63.5]	<0.001

¹OR = Odds Ratio, CI = Confidence Interval

4. Discussion

4.1. Socio-Demographic Characteristics

The average age of the respondents was 33.6 \pm 12.6 years, a young population was also observed in Ethiopia [8], in Tunisia with average ages of 34.56 and 42 years respectively. In our study, the analysis of the distribution according to age groups showed that the respondents mainly belonged to the age group 25-35 years, or 31.2% of similar results were found in Ethiopia [8]. A recent study [9] in Senegal also showed that the age group 25-35 years was the most affected, 128,836 cases of tuberculosis of all forms combined were detected.

4.2. Prevalence of Depression

In our study we found that 37% of individuals with tuberculosis suffered from mild depression, similar results were found (36.6%) in the South-East region of Cameroon [10]. The prevalence of depression in patients with tuberculosis would be 3 times higher than that of “healthy” patients without tuberculosis [11]. In Angola, it was 49.4%, in patients with tuberculosis [12]. In Tunisia, the evaluation of the HAD score was made the average score of which was 14.2 and 50% of the patients had an anxio-depressive syndrome [13].

In eastern Ethiopia, a study found that 51.9% of TB patients had depression [14]. These results are superimposable to those in southern Ethiopia, such as 43.4% in the Wolayta zone [15] and 54% in Gurage and Silte [16]. It is also similar to other studies conducted in sub-Saharan Africa: 49.4% in Angola [12] and 61.1% in the South West region of Cameroon [10]. Similarly, in Pakistan various studies have indicated that patients with tuberculosis reported several psychiatric disorders including depression [17]. There is thus a duplex relationship between depression and tuberculosis.

4.3. Factors Associated with Depression

Older age, level of education, social support, female gender, TB stigmatization and disease duration are depression-associated factors [8].

In our study, as associated factors, the presence of a chronic disease (diabetes, HBP) was identified, the link was statistically significant ($p=0.002$) with a 6.10 times higher risk of developing mild depression (OR_{adj} = 6.10 [1.55-29.0]). A similar result was found in Pakistan [18].

Indeed, the biological vulnerability to tuberculosis infection when a person is diabetic poses a great risk, especially when living close to a person with the disease in its active phase. Tuberculosis can exacerbate or even trigger diabetes by driving individuals to glucose intolerance. In addition, anti-tuberculosis drugs (eg, rifampicin) can make it more difficult to control diabetes.

At the same time, mental depression is also associated with various immunological alterations including reduce in lymphocyte number as well as impaired memory T cell responses. This could explain the link between depression and the 3 crosses found on the smear of tuberculosis patients.

All this allows us to highlight a syndemic between tuberculosis, non-communicable diseases such as diabetes and depression that can be exacerbated by unfavorable living conditions and a precarious social context.

A study in Ethiopia found that stigmatization was also associated with depression. Stigmatized patients were twice as likely to suffer from depression [8]. This result is consistent with the study conducted in southern Ethiopia 43.3% [15]. It has also been shown that the diagnosis of tuberculosis increases the risk of psychiatric complications and social isolation [19]. Indeed, patients with TB stigmatization might use health services less due to social isolation and low self-

esteem. This could drive them to develop depression [8]. This was confirmed in a study which found that 49.6% of patients with depression had low social support [8]. Therefore, this situation tends to aggravate the depression.

4.4. Strengths and Limitations

As a limitation to our work, our sample was not representative of the population. Indeed, the study was carried out during the coronavirus disease pandemic. The number of patients was reduced. The questionnaires were submitted to patients during drug withdrawals, which were no longer done daily, but weekly to limit the flow of patients. Those who were unwilling to be interviewed on the spot were contacted through phone calls. A multicenter study, conducted by mental health professionals, on a larger sample would have allowed us to have more significant results and thus better characterize the associated factors.

Regarding the strengths of our work, mild depression has been documented in patients with tuberculosis. Thus early care taking as well as preventive activities can be carried out in order to fight against suicide.

5. Conclusion and Recommendations

At the end of this study, we can conclude that depression in tuberculosis patients is present, not inconsiderable and requires multidisciplinary care. We therefore recommend that practitioners dealing with cases of tuberculosis systematically involve mental health professionals (psychiatrists and psychologists) in order to improve the daily and social life of these patients.

Declarations

Conflicts of Interest

The authors declare no conflict of interest.

Data Dissemination

The data collected anonymously during the analysis are kept confidential. Only those responsible for the study had access to the data. Permission for data release was requested from participants. The data will also be shared with the scientific community.

Ethical Considerations

We requested free and informed consent from everyone who participated in the study. Parental authorization was required for minor patients.

Data collection was done after consent of the participants. The latter had received all the necessary information on the content of the study.

Evaluation of Ethical Risks

There was a risk reduction for this study because no

administration of drugs, biological fluid samples or clinical and/or para clinical examinations was planned.

Abbreviations

COVID-19: Coronavirus disease 19, WHO: World Health Organization, PHQ-9: Patient Health Questionnaire 9, TB: Tuberculosis, EPT: Extra Pulmonary Tuberculosis

BCPT: Bacteriologically Confirmed Pulmonary Tuberculosis

Acknowledgements

We would like to thank all the staff of the Gaspard Camara health center as well as all the people who participated in this study.

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