



Original Article

Clinical Presentation and Evolution of Tuberculosis of Diabetic Patients Hospitalized at Abass Ndao Hospital from 2010 to 2021

Aspects cliniques et évolution de la tuberculose chez les diabétiques hospitalisés à l'Hôpital Abass Ndao de Dakar entre 2010 et 2021

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ABSTRACT

Introduction. Diabetes is a public health problem and its association with tuberculosis increases its morbidity and mortality. The objective of this paper is to report the frequency of tuberculosis and describe its clinical features in diabetic inpatients at the Abass Ndao Hospital of Dakar. **Patients and methods.** Our work was a cross-sectional, descriptive, study conducted from January 1st, 2010, to December 31st, 2021. It concerned hospitalized diabetic patients with associated tuberculosis infection. Sociodemographic, clinical, para-clinical and evolution data were collected. **Results.** The hospital prevalence of diabetes/tuberculosis association was 0.72% (43/5903), while among the diabetic patients, 37.7% had tuberculosis. In our population study, there were 58.13% of women (sex ratio HF = 0.72). The average age of the population was 40 [19-76] years. The average consultation delay time was 70.59 [3-365] days. Two patients had a notion of contagion. The main reasons for consultation were fever 58.1% (n=25), poor general state 48.83% (n=21) and cough 44.18% (n=19). The mean blood glucose level was 2.825. Twenty-three (23) patients had glycaemia titer superior to 2 g/l. Ketoacidosis was present in 11 patients. Half of the patients had been diabetic for more than 10 years. Thirty six (36) patients (83.72%) had pulmonary tuberculosis and 9.30% (n=4) had extra pulmonary multifocal TB tuberculosis. Anemia was found in 29 65.91% (n=29). The average length of hospitalization was 10.84 days. Four (4) deaths were recorded. **Conclusion.** Tuberculosis in diabetics is an important cause of morbidity and mortality.

RÉSUMÉ

Introduction. Le diabète constitue un problème de santé publique et son association avec la tuberculose augmente sa morbi-mortalité. L'objectif était d'étudier la fréquence de la TB et ses caractéristiques chez les diabétiques hospitalisés en médecine à l'hôpital Abass Ndao de Dakar. **Patients et Méthodes.** Il s'agit d'une étude transversale, descriptive menée du 01 janvier 2010 au 31 Décembre 2021. Elle portait sur les diabétiques hospitalisés atteints d'une tuberculose. Les données épidémiologiques, cliniques, para cliniques et évolutives ont été évaluées. **Résultats.** La fréquence de l'association diabète /tuberculose était de 0,72% (43/5903) et parmi les diabétiques, 37,7% étaient tuberculeux. Dans notre population d'étude, les femmes prédominaient avec 58,1% (sex-ratio de 0,72). Les femmes au foyer étaient majoritaires 30,2%(n=13). Par ailleurs, 20,9%(n=9) étaient sans profession. L'âge moyen était de 40 ans [19-76] ans. Le délai de consultation moyen était de 70,59jours [3 et 365]. Deux patients avaient une notion de contagion. Les principaux motifs de consultation étaient la fièvre 58,1%(n=25), l'AEG 48,83%(n=21) et la toux 44,18%(n=19). La glycémie moyenne était de 2,825. Vingt-trois (23) avaient plus de 2g/l. Une acidocétose était notée chez 11 patients. La moitié des patients était diabétique depuis plus de 10 ans. Plus des 2/3 des patients 83,72%(n=36) avaient une Tuberculose pulmonaire et 9,30 % (n=4) une TB multifocale extra pulmonaire. L'anémie était retrouvée chez 65,9 % (n=29). La durée d'hospitalisation moyenne était de 10,84 jours. Quatre (4) décès étaient enregistrés. **Conclusion.** La tuberculose chez le diabétique est une importante cause de morbidité et de mortalité d'où l'intérêt de sa recherche systématique.

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INTRODUCTION

Diabetes is a public health problem due to its increasing morbidity and mortality. All over the world, the number of people with diabetes mellitus (DM), currently about 451 million, will increase to reach 693 million by 2045[1]. [1] It is a chronic disease, linked to a failure of the biological

mechanisms of blood sugar regulation. It is a remarkable metabolic disease because of its evolution, which is often insidious and leads to a delay in diagnosis. This insidious evolution exposes patients to chronic degenerative complications but also to acute metabolic or infectious

complications requiring a long and expensive treatment. These acute complications deserve special attention, including tuberculosis. Diabetes mellitus alters specific cytokines, which play a role in the protection against tuberculosis (TB) and is a risk factor for the development of active TB [2-3]. Diabetes mellitus triples the risk of developing tuberculosis [4], which is a communicable infectious disease caused by *Mycobacterium tuberculosis* (bacillus Koch or BK). The consequences of the association of tuberculosis and diabetes are well established [5]. In Africa, the frequency of tuberculosis in diabetic patients remains high at 4-15% [6]. This motivated us to carry out this study with the general objective of describing the epidemiological, clinical, paraclinical and therapeutic aspects of tuberculosis infection in diabetics at the Abass Ndao Hospital in Dakar.

PATIENTS AND METHODS

Study setting

The study was conducted at the second Medical Clinic of the Abass Ndao Hospital in Dakar.

This service is composed of 2 departments namely the Marc Sankalé Diabetes Center and the internal medicine hospitalization service with a capacity of 34 beds.

Population and type of study

This was a retrospective descriptive cross-sectional study of diabetic subjects with tuberculosis hospitalized at the Department of internal medicine at Abass Ndao Hospital in Dakar.

The recruitment of our patients was done based on a questionnaire. All diabetic patients hospitalized at the department of internal medicine during the recruitment period from January 1, 2018, to December 31, 2018, for tuberculosis and presenting a complete file were included in our study.

Data collection

Data were collected from the records of patients meeting the inclusion criteria and hospitalized during the study period. A standard questionnaire was established to serve as a basis for data collection for the patients included in the study. It covered marital status, clinical manifestations, biological and biochemical analyses, diabetes and tuberculosis. Questionnaires were completed from the hospitalization records reporting the clinical and paraclinical elements of the patients. Data collected included:

- **Socioeconomic profile:** age, gender, occupation, marital status, address;
- **The study of diabetes mellitus:** The study of diabetes was interested in the type of diabetes, its duration, and the existence or not of other cardiovascular risk factors (smoking, hypertension, obesity, dyslipidemia, age, and alcoholism). Sedentary lifestyle was not assessed.
- **The study of tuberculosis** is interested in the reasons for consultation, the use of any antibiotics, the notion of tuberculosis contagion, smoking, the terrain, the time of consultation, the existence of a clinical infectious syndrome, signs of tuberculosis involvement, the duration of hospitalization.

A patient was considered to have tuberculosis when he had a positive bacilloscopy, a typical radiographic image (nodules, caverns, infiltrates, miliaries) of tuberculosis associated with signs of tuberculosis impregnation (alteration of the general state, fever with chills and sweats, cough). Then classified according to the affected organ. The presence of dyspnea, hemoptysis was also sought, as well as associated diseases.

- **Para-clinical findings:** CBC, creatinine, CRP, HbA1c, lipid panel, renal function and micro albuminuria, Baar sputum, GeneXpert, Rivalta, IDRT, retroviral serology (SRV), electrocardiogram (ECG), chest X-ray, MRI, Ultrasound, The data were entered into Microsoft office Excel and analyzed using Epi info 2000 version 3 software.3.2. The analysis was descriptive and analytical.

Statistical analyses

the data were entered into Microsoft office Excel and analyzed using epi info 2000 version 3.3.2. Continuous variables were described as median and interquartile range, categorical variables as percentage to describe the sociodemographic, clinical and biological characteristics of the population. The characteristics of the analysis population were compared using the Chi-2 test (categorical variables) or the Kruskal-Wallis test (continuous variables).

Ethical considerations

The analysis involved anonymised data and therefore did not contain the exact identity or address of individuals.

RESULTS

Sociodemographic data

During the study period, 5903 patients were hospitalized. One hundred and fourteen (114) tuberculous patients were noted, 43 of whom were diabetic. The frequency of the association of diabetes and tuberculosis in patients was 0.72% and among TB patients, 37.7% were diabetic. Their mean age was 40 years with extremes ranging from 19 to 67 years.

Table I: Distribution of patients by sociodemographic data.

Socio-demographic characteristics	Numbers (n=114)	Percentage (%)
Frequency	43	37.7
Women	25	58.13
Men	18	41.87
Age (years)		
Medium	40	
Extremes	19 to 67	
More than 60	19	44.18
No profession	9	20.93
Housewives	13	30.23
Pupils and students	4	9.30
Merchants	2	4.65
Driver	2	4.65
Carpenter	2	4.65
Retired	4	9.30
(Baker, dyer, pharmacist, day laborer)	7	16.27

There were 25 women (58.13%) with a sex ratio (m/f) of 0.72. Housewives represented 13 cases (30.23%). Moreover, 20.9% (n=9) were without profession. Fifteen patients (15) came from a health facility, i.e. 34.9% (Table I).

Diabetes features

Type 2 diabetes was predominantly represented in 30 cases (69.8%). Inaugural diabetes was noted in 5% of cases. Most patients had diabetes for more than 5 years (55%). Insulin-based treatment was used in 14 patients (32.5%). Ketoacidosis was noted in 11 patients (25.6%) including 2 patients with pre-coma ketoacidosis. Twenty-three (23) patients (53.5%) had hyperosmolar imbalance. The average blood glucose level was 2.825 with extremes of 0.46 and 5.75. Four (4) patients had a blood glucose level <1.5g/l. Six (6) patients had between 1.5 and 1, 96g/l and twenty-three (23) had more than 2g/l.

Tuberculosis features

The average consultation time was 70.59 days with extremes of 3 and 365 days. The duration of hospitalization was reported for 36 patients with an average of 10.84 days and extremes of 1 and 19 days. It was more than 10 days in 45.45% of cases.

The reasons for consultation were dominated by fever 58.1% (n=25), loss of weight 48.8% (n=21) and cough 44.2% (n=19). The following table shows the results (Table II).

Reasons for consultation	Number of employees (n)	Percentage (%)
Fever	25	58.1
Poor general state	21	48.8
Cough	19	44.2
Abdominal pain	11	25.6
Ascites	4	9.3
Dyspnea	6	13.9
Chest pain	7	16.3
Vomiting	6	13.9
Thrills	5	11.6
Headaches	4	9.3
Epigastralgia	2	4.6
Cervical adenopathy	2	4.6
Constipation	1	2.3
Diarrhea	2	4.6
Hypochondrial pain	1	2.3
Expectorations	1	2.3
Hemoptysis	1	2.3
Sweats	1	2.3
IMO	1	2.3

A notion of contag was reported in 2 patients. Two patients were smokers. Retroviral serology (VRS) was performed in 11 patients, and all were negative. The average HbA1c was 6.8%. The mean hemoglobin level was 9.57 and the extremes were 4 and 14.5. More than one third of the patients 37.21% (n=16) had anemia. IDRT was positive in 57.14% of cases. Mycobacterial sputum was positive for 10 patients and 7 GeneXpert. On chest radiography the lesions were dominated by diffuse interstitial infiltrates in 30.43% of cases and caverns in 21.73%. One patient had a hematogenous tuberculosis miliary, i.e. 4.34% (Table III).

Table III: Chest X-ray abnormalities

Type of injury	Number (n=23)	Percentage
Diffuse interstitial infiltration (opacities)	7	30.43
Caverns/ cavities	5	21.73
Alveolar infiltration	4	17.4
Pleural effusion	2	8.69
Lobar consolidation	1	4.34
Ascites effusion	1	4.34
miliary TB	1	4.34
Flaky image	1	4.34
Budding tree	1	4.34

Diagnoses

More than 2/3 of the patients 83.7% (n=36) had pulmonary TB and 9.3% (n=4) had multifocal extra pulmonary TB with peritoneal involvement and 1 patient 2.3% had lymph node TB and 1 patient had miliary TB. Table IV below illustrates the results.

Table IV: Distribution of patients by diagnosis

Diagnosis	Number of employees	Percentage
Pulmonary	36	83.7
Multifocal	4	9.3
Peritoneal tuberculosis	1	2.3
Miliary tuberculosis	1	2.3
Tuberculosis of lymph node	1	2.3
Total	43	100

Seven (7) patients (16.27%) had associated pathologies. Table V below illustrates the associated pathologies (Table VI).

Table V: associated pathologies.

Associated pathologies	Number (n=7)	Percentage (%)
Diabetic foot	2	28.57
Upper GI bleeding	1	14.28
Caustic esophagitis	1	14.28
Loss of weight	1	14.28
Arterial hypertension	1	14.28
Down syndrome	1	14.28

In terms of evolution, more than ¾ of the patients 72.5% (n=29) had a favorable evolution; 20.0% (n=8) were transferred, 4.6% (n=2) were deceased and 2.3 % (n=1) were reported missing

Limitations of the study

The main limitation in our study is the fact that data collection was not exhaustive.

DISCUSSION

Our study has some limitations. The data collection was not exhaustive. Clinically and Para clinically, microalbuminuria, proteinuria for effective diabetic nephropathy, and fundus were not performed in all patients because of the high cost of these examinations. All the variables studied had a satisfactory level of completeness with variables completed in 95% of cases.

In our study, the frequency of tuberculosis in diabetic patients was 0.72%. This was lower than the results found

in the studies carried out in Mali and Senegal, which were respectively 5.2% and 4.7% [7-8]. This finding can be explained by the recruitment mode used in these two studies: the first one included all patients followed up in consultation and in hospital during the study period and the second one included all patients in a pneumological setting. Among hospitalized tuberculosis patients, the frequency of this association remained high and concerned 37.7% of cases. This is because the internal medicine unit receives most diabetics due to the proximity of the diabetes treatment center. This result was close to the one found in Nigeria (38%) [9] but was much higher in a study conducted in Benin (1.9%) [10].

In our study, the mean age was 40 years with extremes ranging between 19 and 67 years. This mean age was lower than the results found in 2 Malian studies which a mean age of 53.4 ± 12.7 years with extremes of 16 and 80 years and 52.4 ± 9 years successively [7, 11].

In our study, the population was predominantly female (58.1%) with a sex ratio (m/f) of 0.72. Our result was like the one of Morad in Morocco [12] who found a female predominance, with a sex ratio of 0.79. The reasons may be related to the role of women in the care of patients but also to the influence of estrogens on the production of cytokines during tuberculosis infection. These conditions may increase the vulnerability of women to tuberculosis [13]. In contrast, many authors have found a predominance of the male gender [7-10, 14, 15]. Type 2 diabetes was predominantly represented with 30 cases (69.76%). Higher proportions of 82% were observed in Mali [7].

The average consultation time was 70.59 days, with extremes of 3 and 365 days. In the study of Mr. Leye, the average delay of consultation was $20.3 \pm (14.8)$ days with extremes of 0 days and 150 days. He stated that 45.2% of the patients had a delay in consultation. Those who were male or self-medicated were 1.5 times more likely to have a delay in consultation [16].

The reasons for consultation were dominated by fever 58.1% (n=25), general condition 48.8% (n=21) and cough 44.2% (n=19). In a study carried out in Mali, cough, chest pain, dyspnea and hemoptysis were found respectively in 86.2%, 59.2%, 29.6% and 9.2% [17]. Another study in Ethiopia found that cough (72.5%) and weight loss (86.2%) were the most frequently reported symptoms associated with active TB in diabetes mellitus patients [18].

Most of our patients had poorly controlled diabetes even though they were under treatment. This same finding was noted by Natacha who found 80% of poorly controlled diabetes [6]. Twenty-three (23) had more than 2g/l and HbA1c. In a cohort study, there was a linear relationship between hyperglycemia and the risk of tuberculosis [19]. However, other studies evaluating HbA_{1c} found no association [20-21]. In our study more than 2/3 of the patients 83.72% (n=...) had pulmonary tuberculosis (TB) and 9.30% (n=4) had extra pulmonary multifocal TB with peritoneal involvement and 2.32% (n =1) had lymph node TB and 2.32% (n =1) had miliary TB. These results corroborate those found in Guinea with pulmonary localization of TB in 324 cases (83.50%), and extra pulmonary in 58 cases (14.95%). Six cases (1.55%)

associated with pulmonary TB with extra pulmonary TB [14].

Associated pathologies

The case fatality was low (4.6%) mainly because most patients were under treatment and knew their diabetes status for at least 5 years in most cases. Comparison with other studies on the association between diabetes and TB.

CONCLUSION

Diabetes, especially unregulated diabetes, increases vulnerability and susceptibility to TB. Indeed, in diabetics, TB sets in insidiously, thus delaying its diagnosis. In addition, there is a bad exchange between diabetes and tuberculosis "diabetes exposes to the occurrence of TB and TB unbalances diabetes". Thus, it is important to prevent this condition in patients with diabetes. This prevention involves hygienic and dietary measures, screening, compliance with medical treatment, and therapeutic education.

Conflicts of interest

The authors certify that they have no affiliation with or involvement in any organisation or entity with a non-financial interest or stake in the subject matter of this manuscript.

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Authors' contributions

Ngom Ndeye Fatou, Sow Djiby: design, data collection, data curation, statistical analysis, writing original draft and manuscript review.

Other authors: design, Writing, manuscript review and editing.

All the authors have read and approved the final version of the manuscript.

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