Diabetes Screening and Cardiovascular Risk in Tuberculosis Patients in Conakry and Surrounding Towns

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Abstract

Objective: To determine the prevalence of diabetes and the level of cardiovascular risk in tuberculosis patients treated in Conakry and surrounding towns. **Method**: This was a cross-sectional study carried out at tuberculosis treatment centers in Conakry and surrounding towns (Coyah and Dubréka) on World TB Day, November 14, 2022, among 350 tuberculosis patients. We determined the proportion of TB patients with diabetes and high hyperglycemia. We determined the Chi-square to identify the factors associated with the occurrence of diabetes in tuberculosis patients, and a significance threshold with $p < 0.05$ was considered. **Results**: The average age of participants was 33.5 ± 14.5 years, and they were predominantly male (59.7%). The majority of participants lived in Conakry (96.3%). 5.7% were known diabetics and 4.6% were known hypertensives. We found a prevalence of diabetes of 9.4%. Among diabetics, 39% were diabetes discoveries. 30% were hypertensive or had high blood pressure. Of these hypertensive patients, 26.4% were unrecognized hypertensives. Age and hypertension were statistically significantly associated with the onset of diabetes in tuberculosis patients. Medium, high and very high levels of cardiovascular risk were present in 23.4%, 8.9% and 3.4% respectively. **Conclusion**: Diabetes is common in tuberculosis patients. Cardiovascular risk factors, notably hypertension and cardiovascular risk level, are frequently associated with tuberculosis. Tuberculosis patients with cardiovascular risk factors should be screened for diabetes.

Keywords

Screening, Diabetes, Tuberculosis, Cardiovascular Risk, Conakry

1. Introduction

Tuberculosis remains a major public health problem in sub-Saharan Africa, with an increasing incidence and mortality rate [1]. According to the World Health Organization's 2022 report, an estimated 10.6 million people fell ill with TB in 2021, compared with 10.1 million in 2020, and 1.6 million people died of TB in 2021 (including 187,000 people living with HIV), compared with 1.5 million in 2020 (including 214,000 people living with HIV). In addition, the incidence rate of tuberculosis increased by 3.6% in 2021 compared with 2020, suggesting a reversal of the downward trend of almost 2% per year over the past two decades [2]. Diabetes multiplies the risk of contracting tuberculosis and is associated with adverse effects [3]. According to the literature, diabetes increases the risk of contracting tuberculosis by 2.4 to 8.8 times compared with the rest of the population [4].

The association between tuberculosis and diabetes is increasingly important in low- and middle-income countries faced with a growing burden of non-communicable diseases [5] [6] [7]. The literature reports a strong association between diabetes and active tuberculosis [8] [9]. Diabetes also has a negative impact on tuberculosis treatment outcomes [10] [11].

Controlling this epidemic can only be achieved by limiting transmission of the bacillus in developing countries. A patient with active tuberculosis can infect ten to twenty people during the natural history of his disease in developing countries [12]. Diabetes exposes people with diabetes to infections, making them more vulnerable to infections and to developing severe forms of the disease [13] [14].

The prevalence of diabetes in tuberculosis patients ranges from 3.5% to 5.7% in sub-Saharan Africa [15] [16] [17].

The national tuberculosis control and non-communicable disease control programs have implemented strategies to integrate diabetes and tuberculosis care into the screening and management of these two epidemics. To this end, a diabetes screening campaign was carried out on November 14, 2022, World Diabetes Day, to determine the prevalence of diabetes and the level of cardiovascular risk among tuberculosis patients in Conakry and surrounding towns.

2. Material and Methods

2.1. Study Type and Setting

This was a descriptive cross-sectional study carried out on World Diabetes Day, November 14, 2022, in the various tuberculosis management sites in the city of Conakry and surrounding towns.

Sampling was non-random and for convenience. Tuberculosis patients were included as and when they presented at the various tuberculosis treatment centers in Conakry and surrounding towns. Tuberculosis patients followed up at the various centers who had given verbal consent to participate in the study were included.

2.2. Variables and Data Collection

Data were collected during interviews using a standardized questionnaire previously protested for this purpose and implemented in KoboCollect software for data collection. Study variables were classified into two groups, independent and dependent.

The independent variables were socio-demographic (age, residence Conakry or Coyah or Dubréka).

The dependent variables were the existence of diabetes (patient surveyed who declared to be a known diabetic, or who was on hypoglycemic medication, or who had a fasting blood glucose level greater than or equal to 1.26 g/l, or a random blood glucose level greater than or equal to 1.26 g/l).

The existence of arterial hypertension (a patient declaring hypertension, or a patient treated with antihypertensive medication, or a patient with systolic blood pressure greater than or equal to 140 mmHg and/or diastolic blood pressure greater than or equal to 90 mmHg). High or very high cardiovascular risk. The level of cardiovascular risk was determined according to World Health Organization Region D (which took into account the following parameters: existence of diabetes, smoking, systolic blood pressure level, median 5 mmol/l total cholesterol was considered for all patients).

2.3. Data Analysis

Data were entered and analyzed in SPSS version 22.0. Tuberculosis patients were compared on sociodemographic characteristics, presence of diabetes. We used the χ^2 test with a significance level below 0.05 to determine the factors associated with the occurrence of diabetes.

2.4. Ethical Considerations

The study protocol was approved by the scientific council of the Faculty of Health Sciences and Techniques of the Gamal Abdel Nasser University of Conakry. Each participant was informed of the purpose of the study, and consent was obtained.

Free and informed consent was obtained prior to inclusion. Anonymous codes were used to mask the identity of participants.

3. Results

We screened 477 participants for diabetes, 350 of whom were on anti-tuberculosis treatment or confirmed tuberculosis patients on the day of the diabetes screening. Data analysis focused on the 350 patients with confirmed tuberculosis.

We included 350 participants with a mean age of 33.5 ± 14.5 years. They were predominantly male, *i.e.* (209) 59.7% of participants. Over (337) 96% of participants lived in Conakry. (20) 5.7% were known diabetics and (16) 4.6% were known hypertensives. Other socio-demographic and clinical characteristics are described in Table 1.

Table 1. Socio-demographic and clinical characteristics of participants.

	N	%
Average age (years) Gender	33.5 ± 14.5	NA
Sexe		
Male	209	59.7
Female	141	40.3
Residence		
Conakry	337	96.3
Coyah	10	2.9
Dubreka	3	0.9
History of diabetes		
no	330	94.3
yes	20	5.7
History of arterial hypertension		
no	334	95.4
yes	16	4.6
Total	350	100.0

Age and hypertension were statistically significantly associated with the onset of diabetes in tuberculosis patients. Other factors are described in Table 2.

We found a prevalence of diabetes of (33) 9.4%. Among these diabetics, (13) 3.9% were new diabetics (Table 3).

30% were hypertensive or had high blood pressure. Of these hypertensive patients, 26.4% were unrecognized hypertensives (Table 3).

Cardiovascular risk levels were variable in our series. Medium, high and very high cardiovascular risk levels were present in 23.4%, 8.9% and 3.4% respectively (Table 4).

Discussion:

We carried out a cross-sectional study of diabetes screening in the population followed up for tuberculosis in the various tuberculosis management sites in Conakry, coyah and Dubreka. This study has limitations in terms of the representativeness of patients from the surrounding towns, so the results cannot be extrapolated to the population of these prefectures.

Participants were young, with an average age of 33.5 ± 14.5 years. The young age of the participants could be explained by the fact that the Guinean population is predominantly young, and also by the fact that it is this segment of the population that is active, and therefore more exposed to the contagion of cases of tuberculosis. Nearly 60% of participants were male. This could be explained by the fact that males are more exposed to cardiovascular risk factors, and more active than others.

Table 2. Prevalence of diabetes and l in tuberculosis patients.

	Presence of diabetes		Total
	no	yes	
Unknown diabetic	317 (96.1%)	13 (3.9%)	330
Known diabetic	0 (0%)	20 (100)	20
Total	317 (90.6%)	33 (9.4%)	350

Table 3. Prevalence of hypertension in tuberculosis patients.

	Presence of arterial hypertension		Total
	non	oui	
Not known hypertensive	244 (100%)	90 (84.9%)	334 (95.4%)
known hypertensive	0 (0%)	16 (15.1%)	16 (4.6%)
Total	244 (100%)	106 (100%)	350 (100%)

Table 4. Cardiovascular risk levels.

	N	%
Low risk (<10%)	225	64.3
Medium risk (10% - 20%)	82	23.4
High risk (20% - 30%)	31	8.9
Very high risk (≥30%)	12	3.4
Total	350	100.0

The prevalence of diabetes we observed in the tuberculosis population of Conakry and surrounding towns is higher than that reported by Baldé NM *et al.* in 2006, who reported 3.35% diabetes among the tuberculosis population followed in Conakry, and that of the general population in the STEP survey in Guinea in 2009 [15] [18]. This The increase in prevalence could be explained by the rise in cardiovascular disease in general and diabetes in particular (ref Atlas IDF 2021, progressif des maladies cardio-vasculaire). Age and hypertension were the factors associated with the onset of diabetes in our series. These factors have also been reported in the literature. This may be explained by the fact that age and hypertension are often associated with the onset of diabetes [15] [19]. Other factors associated with the onset of diabetes have been cited in the literature, including obesity, smoking and a family history of diabetes, hypertension and obesity [20] [21].

30.3% of TB patients were either known hypertensives or had high blood pressure. This finding is in line with the literature, which shows the exponential progression of cardiovascular disease in general and hypertension in particular [22] [23] [24].

Tuberculosis patients had high and very high cardiovascular risk levels in 8.9% and 3.4% respectively. This result confirms the concomitant presence of cardio-

vascular disease and infectious diseases [22] [25] [26].

4. Conclusion

The prevalence of diabetes in tuberculosis patients remains high in our series. Age and arterial hypertension were the factors associated with the occurrence of diabetes. Diabetes is common in tuberculosis patients. Cardiovascular risk factors, notably arterial hypertension and cardiovascular risk level, are frequently associated with tuberculosis. Systematic screening for diabetes in tuberculosis patients should be initiated as soon as tuberculosis is confirmed.

Conflicts of Interest

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

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