

Research Article

HIV prevalence and diabetes prevalence among tuberculosis patients in Antananarivo city: a descriptive study

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ABSTRACT

Background: In developing countries, HIV infection is the main disease leads to tuberculosis (TB) active. Each tuberculosis (TB) patient of TB diagnosis and treatment centers in Antananarivo city should receive HIV serology counseling. The TB-diabetes association is rarely considered. In general population in Madagascar HIV was 0.37% in 2010 and Diabetes affects about 3% of the population. This study aims to estimate the prevalence of HIV infection and diabetes among TB patients.

Methods: A descriptive study in three TB diagnosis and treatment centers in Antananarivo city was conducted between July 15, 2013 and October 30, 2013. TB Patients aged 18 years and older were enrolled. They completed HIV and blood glucose testing after informed consent.

Results: Among 156 TB patients, one case is HIV positive [0.6% (0.1 - 3.6)] and two are indeterminate [1.3% (0.4 - 4.6)]. The HIV infection case relates to an extrapulmonary TB. Nine cases of diabetes were diagnosed [5.8% (3.1 - 10.6)], and four of them had their diabetes status before the study. Six diabetics are between 40 and 50 years. Among TB patients, diabetes prevalence is nine times higher than HIV prevalence ($P = 0.01$).

Conclusion: As for people living with HIV, diabetics should benefit TB prevention and routine screening of TB. Creating mechanism of collaboration between the diabetes program and TB program should be one of health priorities.

Keywords: Tuberculosis, HIV, Diabetes, Antananarivo city

INTRODUCTION

Developing the active form of tuberculosis (TB) depends on exogenous factors by exposing the individual to Mycobacterium tuberculosis and endogenous factors.¹ HIV co-infection is a potential endogenous factor of TB disease.^{2,3} HIV infection accelerates the progression of primary infection and promotes TB relapse.^{4,5} By disrupting the natural and acquired immune responses, diabetes promotes also the development and proliferation

of Mycobacterium tuberculosis.⁶ Both immune dependent diseases, HIV infection and diabetes, are now rapidly emerging in low and middle income countries.^{7,8} In these countries, the literature highlights the frequency of TB-HIV co-infection⁹ and TB-diabetes association.^{10,11} In Madagascar, the new cases of smear-positive TB pulmonary (PTB+) increased from 65 to 82 per 100000 inhabitants from 1996 to 2004.¹² The prevalence of HIV infection in the population was 0.37% in 2010.¹³ Besides, the prevalence of TB-HIV co-infection increased. They

were respectively 0.22% and 0.9% in 1993 and 2006.^{14,15} As for diabetes, it affects about 3% of the population.¹⁶ Therefore, the TB-Diabetes association should be more frequent than association TB-HIV. This article aims to estimate the prevalence of HIV infection and the prevalence of diabetes among TB patients.

METHODS

Setting

The study was conducted in three main centers for diagnosis and treatment of TB (CDT) in Antananarivo city: (i) CDT of public health teaching hospital, which is the largest CDT integrated in teaching hospital (ii) CDT of Anatihazo which is the largest CDT integrated in a private health facility (iii) CDT of Analamahitsy which is the largest CDT integrated in a basic public health facility.

Design

It is a descriptive study conducted between July 15, 2013 and October 30, 2013. TB patients aged 18 years and over were enrolled, all clinical forms combined. For each TB patients included, HIV infection serology and glucose blood test were performed after counseling and consent.

Criteria of positivity

For TB, this study applied the criteria recommended by WHO.¹⁷ For HIV infection; the Determine HIV 1/2, the Retrocheck HIV and the Unigold HIV are respectively the 1st, 2nd and 3rd tests.¹⁸ A plasma glucose higher than 1.26 g/l (5.56 mmol/l) in twice, is considered as diabetes.¹⁹ And a patient who claims to be diabetic, although his plasma glucose is less than 1.26 g/l is classified as diabetic.

Data collection and data analysis

In addition to biological data, an interview and operation of medical records were conducted to obtain the profile (age, sex, occupation, clinical form of TB, treatment) of each subject included in the study. Data were collected in a file standard and analyzed by Excel and SPSS software. A 95% confidence interval for each proportion was calculated.

Ethical consideration

Patients eligible and selected for this study received an explanation of the study purpose and an explanation of the laboratory tests to be performed. Informed consent was signed by each participant before conducting all interviews and all laboratory tests. For the particular case of HIV infection, each participant received a pre-test and a post-test counseling according to the standards applied in Madagascar.¹⁸ In addition, these standards already stipulate that each TB patients should receive a

counseling of HIV screening. Their anonymity was respected by using patient's code during the study.

All TB cases received free TB treatment, six months for new cases and eight months for retreatment cases. After confirmation, HIV cases referred to the HIV physician of Joseph Raseta Befelatanana Teaching Hospital (HJRB). A second serologic confirmation is scheduled three months later for indeterminate HIV infection cases. Each case of confirmed diabetes is referred to the endocrinologist of HJRB.

RESULTS

A total of 156 TB patients met the inclusion criteria. The average age (\pm standard deviation) is 37.5 years (\pm 11.4). The sex ratio male / female is 2.1/1. Although there is no significant difference, women TB patients are younger than men (36.6 years versus 37.8 years).

One case is HIV positive [0.6% (0.1 - 3.6)] among the 156 TB patients enrolled to this study, and two cases are indeterminate HIV serology [1.3% (0.4 - 4.6)]. The confirmed HIV infection case concerns a woman with TB extrapulmonary (PET). The indeterminate cases relate students less than 30 years with a PTB+.

Nine cases of diabetes are diagnosed during this study [5.8% (3.1 - 10.6)], four men and five women. Among these nine cases, four are reported to have already known their "diabetic" status before the study. The majority of these diabetic patients (six out of nine) are aged between 40 and 50 years (Table 1). Among TB patients, the diabetes prevalence is significantly higher than the HIV prevalence ($P = 0.01$).

During this study, no TB patient has both HIV and diabetes.

Table 1: Distribution of TB patients according to their "diabetic" status.

Age (years)	Diabetic		Total
	Yes	No	
<30	0	45	45
30 - 40	2	40	42
40 - 50	6	39	45
50 - 60	1	19	20
≥ 60	0	3	3
Total	9	146	155*

* One missing data (age)

DISCUSSION

In developing countries, TB is usually associated with poverty²⁰ and/or HIV infection.⁹ The TB-Diabetes association is rarely discussed although diabetes is a potential factor in the development of TB active.¹¹ The

present study confirms that for tuberculosis diagnosed in three main CDT of Antananarivo city, diabetes prevalence is nine times higher than HIV prevalence among TB patients (5.8% versus 0.6%). It is difficult to establish a causal relationship between diabetes and tuberculosis by a descriptive study like this study. However, four diabetics out of nine already knew their status before developing TB. Indeed, at least for these four cases (2.6%), diabetes would have contributed to the development of TB.

The relationship between TB programme and HIV programme is much more structured in Madagascar than the relationship between TB programme and Diabetes programme. Because according to the TB programme and the HIV programme, each TB patient should receive counseling regarding HIV screening.^{18,21} The opportunity to know HIV status facilitates the adaptation of treatment in order to increase the chance of successful TB treatment and to reduce the risk of death.²² It is in this sense that WHO recommends TB prevention and TB detection among people living with HIV.²³

Creating mechanism of collaboration between the Diabetes programme and TB programme should be one of health priorities. The main objective of this collaboration is to promote diabetes screening for all TB patients and TB screening for all diabetics. Collaboration between TB and HIV programmes is a good example. The possibility of early identification of possible TB-Diabetes association allows offering better care to patients.

CONCLUSION

As for people living with HIV, diabetics should receive TB prevention and TB screening. In addition, TB patients should receive prevention and diabetes screening.

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Conflict of interest: None declared

Ethical approval: Not required, because we applied the Madagascar's standards regarding HIV counseling for TB patients

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