Death in patients with tuberculosis and diabetes: Associated factors

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ABSTRACT

Aims: Identify factors associated with death in patients with tuberculosis and diabetes.
Method: The descriptive – analytic epidemiologic study using secondary data of tuberculosis cases reported in TBWEB from 1996 to 2014 is used. The profile analysis of the variables in relation to death controlled by the cure of the patients was performed by the software R, the independent variables that could be associated with the dependent variable in a 20% significance level, using the chi-square test. The analysis was performed on an unconditional logistic regression model. Odds ratio (OR) adjusted measures were obtained in order to evaluate the strength of association between independent variables.
Results: Looking into the database TBWEB, from 1996 to 2014, 5361 cases of TB were reported, and from these cases, 4447 contained information about the closure and were complete. Patients with TB and DM represented 306 cases (6.35%). In relation to death, protective factors were: diabetes with OR: 0.69; follow up received during the treatment of medium and high complexity services, with OR: 0.51 and the other type with OR: 0.56.
Conclusion: Diabetes appeared as a protective factor for death in patients with tuberculosis in this study. The development of studies like this allows the expansion of knowledge on the TB-DM association.

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1.   Introduction

As a priority of Public Health, tuberculosis (TB) currently occupies a larger part of the world scenery. The UN (United Nations) estimates that one-third of the world's population is infected with *Mycobacterium tuberculosis*. Brazil has ranked 15th among 22 leading nations with the highest TB incidence. According to the Ministry of Health, Brazil has an incidence of 41/100,000 inhabitants with the highest concentration in the states of São Paulo, Rio de Janeiro, and some states of Amazonas region [1,2].

Considering the underreporting of TB in Brazil, the Ministry of Health estimated that 129,000 cases occur every year. Of these, 90,000 on average are reported, which highlights the concern over the outcome of treatment, especially in relation to high morbidity and mortality that are still currently observed [2,3].

The disease has transmission and incidence characteristics related to socioeconomic factors and lifestyle habit. In addition, it has a direct action over the immune system. Thus, poverty, malnutrition, HIV infection, drug resistance, and diabetes mellitus have been increasingly identified as factors directly associated with the prevalence of TB [3–5].

In recent studies, Diabetes Mellitus has been pointed out as a risk factor for TB, as well as an associated factor in the severity and response to TB treatment. It is estimated that individuals living with diabetes mellitus are four times more likely to develop pulmonary TB [6,7].

Diabetes Mellitus is also a public health priority. According to the World Health Organization, Diabetes Mellitus is the fifth leading cause of death worldwide, and it expects the number to double by 2030; furthermore, it indicates that new cases have increased, especially in developing countries like Brazil, in addition to late diagnosis, which is still part of the national current scenario [4,7,8].

Both TB and DM, when associated, deserve special attention. There is a number of evidence pointing out to their influence in TB treatment, even in the conversion of bacilloscopy, which may take 3–4 times longer than in non-diabetic patients [6,9].

Since the 90s, the mortality rate has reduced by almost half in patients with TB. However, mortality is still a great concern, and its reduction has been occurring very slowly, especially due to the significant presence of death to TB and DM patients. Thus, when these two diseases occur simultaneously, there is a considerable interest on how they may influence each other in relation to mortality [7,10].

The studies reporting the implications of the association between TB and DM in the outcome of TB are recent and very few. Both diseases are difficult to treat and control due to their direct action on the immune system and the need for a lifestyle change. The purpose of this study was to analyze the association of diabetes in cases of death in patients with tuberculosis. The study was carried out at a regional department of health in the state of São Paulo from 1996 to 2014.

2.   Method

This is a descriptive and retrospective epidemiological study using secondary data of TB cases reported in the TBWEB information system from 1996 to 2014. The study period was chosen based on the creation of the TBWEB. Study population resides in the municipalities located in the area reached by the Regional Department of Health of Sao Jose do Rio Preto (DRS-XV), which is comprised of 102 municipalities and a total population of 1,472,771 inhabitants (IBGE 2015).

Data was retrieved from the patients' medical records, from TB diagnosis until the case is closed through communication with the Information System for Notifiable Diseases (SINAN).

TBWEB system is an online information system designed to monitor confirmed cases of tuberculosis in the state of São Paulo, using patient medical records from the diagnosis until the case's conclusion through an effective communication with SINAN. In this study, we considered as a confirmed case of tuberculosis, patients with positive bacilloscopy or clinical-epidemiological criteria that defined the diagnosis, according to the Ministry of Health, Brazil. Diabetic patients were considered according to criteria set by the American Diabetes Association how to hyperglycemia cases identified in fasting blood glucose resulting from failures arising from secretion and/or action of insulin.

After data collection, we excluded all cases with diagnosis changes, without closure or those in which the patient was transferred to another state, once TBWEB system is periodically updated until the case is closed. In order to achieve data completeness, accuracy, and validity, we also excluded all open cases of TB notifications in which the notifying municipality was not in the range area of the DRS-XV.

"Completeness of data" refers to the quality of the form completion on the notification reporting file (FNI) and the subsequent correct data entry by the user in the TBWEB system, this was an inclusion criteria. In this study was considered only complete data, according the select variables.

Then, consulting TBWEB database, from 1996 to 2014, we identified 5361 cases of tuberculosis. How the objective of this study was to evaluate the DM association with closure TB cases, 4820 cases had information about their closure. Excluded 541 cases without closure.

The variables selected for factor analysis were stratified into four dimensions: socioeconomic (age group and sex); clinical (new case – it's the tuberculosis patient who never been submitted to anti-tuberculosis chemotherapy, made use of antituberculosis drugs for less than 30 days, or subjected to treatment for tuberculosis five years according to the Ministry of Health, Brazil; and TB type – pulmonary, extrapulmonary, and others); related to TB discovery (diagnostic services – Primary care, Medium and High complexity services, Urgency and emergency care, and Detention center; Diabetes Mellitus – Yes or No; and problems related – A