The Brazilian Journal of
INFECTIOUS DISEASES

www.elsevier.com/locate/bjid

Original article

Chronic symptoms and pulmonary dysfunction in post-tuberculosis Brazilian patients

Simone de Sousa Elias Nihues[a,b], *Eliane Viana Mancuzo*[c], *Nara Sulmonetti*[c], *Flávia Patussi Correia Sacchi*[b], *Vanessa de Souza Viana*[c], *Eduardo Martins Netto*[d], *Silvana Spindola Miranda*[c], *Julio Croda*[b,e,*]

[a] *Department of Physical Therapy, Centro Universitário da Grande Dourados, Dourados, MS, Brazil*
[b] *Faculdade de Ciências da Saúde, Universidade Federal de Garnde Dourados (UFGD), Dourados, MS, Brazil*
[c] *Faculdade de Medicina, Universidade Federal de Minas Gerais (UFMG), Belo Horizonte, MG, Brazil*
[d] *Instituto Brasileiro para Investigação da Tuberculose/Fundação José Silveira, Salvador, BA, Brazil*
[e] *Fundação Oswaldo Cruz, Campo Grande, MS, Brazil*

ARTICLE INFO

Article history:
Received 17 April 2015
Accepted 26 June 2015
Available online 5 August 2015

Keywords:
Brazil
Dysfunction
Spirometry
Tuberculosis

ABSTRACT

Background: Questionnaire and spirometry were applied to post-tuberculosis indigenous and non-indigenous individuals from Dourados, Brazil, to investigate the prevalence of chronic respiratory symptoms and pulmonary dysfunction.
Methods: This was a cross-sectional study in cured tuberculosis individuals as reported in the National System on Reportable Diseases (SINAN) from 2002 to 2012.
Results: One hundred and twenty individuals were included in the study and the prevalence of chronic respiratory symptoms was 45% (95% CI, 34–59%). Respiratory symptoms included cough (28%), sputum (23%), wheezing (22%) and dyspnea (8%). These symptoms were associated with alcoholism, AOR: 3.1 (1.2–8.4); less than 4 years of schooling, AOR: 5.0 (1.4–17.7); and previous pulmonary diseases, AOR: 5.4 (1.7–17.3). Forty-one percent (95% CI, 29–56) had pulmonary disorders, of which the most prevalent were obstructive disorders (49%), followed by obstructive disorder with reduced forced vital capacity disorders (46%) and restrictive disorders (5%). The lifestyle difference could not explain differences in chronic symptoms and/or the prevalence of pulmonary dysfunction.
Conclusion: The high prevalence of chronic respiratory symptoms and pulmonary dysfunction in post-tuberculosis patients indicates a need for further interventions to reduce social vulnerability of patients successfully treated for tuberculosis.

* *Corresponding author at*: Faculdade de Ciências da Saúde, Universidade Federal da Grande Dourados, Rodovia Dourados – Itaúm Km 12, Dourados, Mato Grosso do Sul, 79804-970, Brazil.
E-mail address: juliocroda@ufgd.edu.br (J. Croda).
http://dx.doi.org/10.1016/j.bjid.2015.06.005
1413-8670/

Introduction

Tuberculosis (TB) is a chronic disease with one of the highest morbidity and mortality rates worldwide. Certain groups, such as indigenous populations, may be more susceptible to developing the disease.[1–3] The incidence of TB among indigenous people is consistently higher than in the general population. Between January 2002 and December 2008, the mean of annual TB notifications in the indigenous population of Dourados was 260 per 100,000 inhabitants compared to only 25 per 100,000 inhabitants in non-indigenous populations.[4–6] Among treated and cured TB patients, some may develop respiratory sequelae characterized by chronic respiratory symptoms, including cough, sputum, and dyspnea. These sequelae may persist even in individuals who have been properly treated for TB and should not be overlooked as they have a negative impact on the individual's quality of life.[7]

There is no consensus on which disorder is the most prevalent in individuals with TB sequelae.[7–12] Population-based studies are needed to investigate the persistence of chronic symptoms and changes in lung function. In addition, indigenous populations have different immune responses and risk factors associated with TB compared with non-indigenous populations.[13,14] Thus, further studies are needed to clarify whether there are differences with regard to the prevalence of these changes between these two populations. In this sense, the objective of this study was to investigate the prevalence of chronic respiratory symptoms and pulmonary dysfunction in post-tuberculosis individuals and to compare these results between indigenous and non-indigenous populations of Dourados-MS.

Material and methods

Study design and inclusion and exclusion criteria

This was a cross-sectional population-based study of indigenous and non-indigenous individuals with a history of TB as reported by the National System on Reportable Diseases (SINAN) from January 2002 to December 2012 in Dourados-MS. We included individuals with notifications of TB to the SINAN diagnosed between 2002 and 2012. We excluded individuals under 18 or over 65 years of age, prisoners, residents of other municipalities, and patients with changes in diagnosis or with neurological disorders.

Data collection was conducted by visiting each participant's home from November 2013 to October 2014. The questionnaire was administered to the participants in order to collect sociodemographic, clinical and epidemiological variables that could be associated with the development of pulmonary changes post-tuberculosis such as persistence of respiratory symptoms and pulmonary function. The following variables were considered: gender, age, educational level, nationality, race, occupation, marital status, alcohol use, smoking, passive smoking, previous pulmonary diseases (pulmonary emphysema, bronchitis, and pleural effusion), work in a dusty and/or smoky environment, wood-stove use, and persistence of respiratory symptoms such as cough, phlegm, sputum, wheezing, and dyspnea after successful TB treatment.

Spirometry

Evaluations of pulmonary function were performed by spirometry using a portable spirometer Koko Spirometer (manufactured by nSpire Health, Inc, Lefthand Circle, Longmont, USA, Koko PFT Software, Series No. 1329K3A39) that allowed for the new Brazilian standards for calculating the theoretical value of adults according to the new reference values for forced spirometry in Brazilian populations to be used.[12] We evaluated the forced expiratory volume in one second (FEV_1), the forced vital capacity (FVC), ratio of the forced expiratory volume in one second to the forced vital capacity (FEV_1/FVC), and the forced expiratory flow between 25 and 75% ($FEF_{25–75\%}$). The tests consisted of pre- and post-bronchodilator phases, the latter obtained 15 min after the administration of 400 μg of salbutamol.

Patients were classified in accordance to the Guidelines for Pulmonary Function Tests of the Brazilian Society of Pneumology and Tisiology. Spirometry was considered as normal when the FVC, FEV_1 and FEV_1/FVC were equal to or greater than 80% of the predicted value. Obstructive disorder was considered when the FEV_1/FVC ratio was below 80% and FEV_1 was less than 80% of the predicted value. A patient was classified with a restrictive disorder when the FEV_1/FVC ratio was less than 80% and FVC was below 80% of the predicted value. Obstructive disorder with reduced forced vital capacity was considered when the difference between FVC and FEV_1 for the pre-bronchodilator phase was less than or equal to 12%.[15]

Statistical analysis

All clinical data were entered in duplicate into the electronic database EpiData, version 3.1 (The EpiData Association, Odense, Denmark), and SAS version 9.2 (SAS Institute, Cary, NC) was used to analyze the univariate and multivariate models associated with chronic symptoms. Dichotomized and categorical data were analyzed with the chi-squared test or Fisher's exact test. For continuous variables, the t-test or analysis of variance (ANOVA) were utilized. Univariate analyses were performed to verify the associations between the dependent and independent variables, and those achieving a pre-specified level of significance ($p < 0.20$) were included in the multivariate analysis. Logistic regression analysis was used to estimate the adjusted odds ratios.

Ethical considerations

All eligible individuals were informed about the study, and the questionnaire and spirometry were performed after receiving a written approval in the informed consent. Informed consent forms in the Guaraní language were used for the indigenous population. The consent forms were read to the illiterate participants and they provided their consent using their fingerprint. The project was approved by the Research Ethics Committee of the Federal University of Grande Dourados and by the National Research Ethics Committee of the