Risk factors analysis of drug resistance in pulmonary tuberculosis patients with relapse in northern Thailand

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Abstract

The objective of this study was to analyze risk factors of drug resistance in pulmonary tuberculosis patients with relapse. A total of 196 pulmonary tuberculosis patients with relapses from 2001 to 2005 were referred to the Office of Communicable Disease Prevention and Control Region 10, Thailand. Data were collected from the tuberculosis chart. Classification tree and logistic regression analysis were used to determine the risk factors of drug resistance. According to the optimal classification tree, three risk factors were determined: number of

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previous TB treatments, weight at baseline and shortness of breath. In the logistic regression model, four risk factors were found to be significant: underlying disease (odds ratio (OR) = 2.3; 95% CI, 1.1-4.4); cavity (OR = 2.8; 95% CI, 1.2-6.9); number of previous TB treatments ≥ 2 times (OR = 2.7; 95% CI, 1.0-7.1); and age ≥ 65 years (OR = 2.4; 95% CI, 1.1-5.1). However, the logistic regression model and optimal tree had low sensitivity, possibly due to the lack of potential risk factors that were not considered in this study. The findings underscore that the treatment of relapse patients, those with at least two previous TB treatments should be subjected to a drug susceptibility test so that an appropriate form of treatment can be prescribed.

Keywords and phrases: Pulmonary tuberculosis, drug resistance, relapse, risk factors, logistic regression, classification tree.

Introduction

Tuberculosis (TB) is an important cause of death due to infectious disease. There are an estimated 8.8 million new TB cases in the world annually from which 1.6 million deaths occur every year [1]. Moreover, the emergence of drug resistant tuberculosis is one of the major threats to the control and prevention of tuberculosis. In Thailand, the prevalence of primary and acquired multi-drug resistance was reported in all regions, at 1.06% and 20.3%, respectively [2], and in the northern region at 4.0% and 13.4%, respectively [3].

Drug resistance might occur because of poor compliance to drug treatment or incompletion of its course, which affects the bacilli mutation in *Mycobacterium tuberculosis* [4-5]. Most reports on the risk factors of drug resistance come from common TB patients [6-8], and it is not known whether the figures can be theoretically referred to relapsed TB patients.

The objective of this study was to analyze the risk factors of any first-line drug resistance (isoniazid, streptomycin, ethambutol, or rifampicin) in pulmonary tuberculosis patients with relapse, using logistic regression and classification tree analysis.

Materials and methods

For the purpose of this study, 196 pulmonary tuberculosis patients with relapses (as defined by the WHO [9]) from 2001 to 2005 were referred to the Office of Communicable Disease Prevention and Control Region 10, Thailand. Data were collected from the tuberculosis chart. The protocol