



ORIGINAL ARTICLE

A Study on the Relapse Rate of Tuberculosis and Related Factors in Korea Using Nationwide Tuberculosis Notification Data

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Abstract

Objectives: From the perspective of public health, tuberculosis (TB) remains an important issue that threatens health. Korea is an intermediate burden country with a TB incidence of 97/100,000 individuals. Among many TB control measures, a relapse rate of TB is one indicator that can be used to indirectly assess the level of TB control in countries and in communities. Relapse TB has an approximately 12% yearly incidence in Korea. This study aims to estimate the relapse rate of TB and to investigate the associated factors by using nationwide TB notification data in Korea.

Methods: The nationwide TB notification data in 2005 was used with the exclusion criteria of duplicated reporting, foreign-born patients, outcome—died, and outcome—diagnosis changed. The data were double-checked as to whether they were reported again during 2006–2010 and the estimated relapse rate of TB. Associated factors were analyzed by multivariate logistic regression with the variables of age, sex, registration type, results of sputum smear test, medication, and outcome of treatment.

Results: Among 45,434 TB patients in 2005, 4,371 patients were again reported as TB patients from 2006 to 2010. Five hundred and sixty-four patients were reported more than twice and the cumulative number of relapses was 5,072 cases. The 5-year relapse rate was estimated as 9.62%. The relapse rate decreased yearly: 4.8% in 2006, 2.4% in 2007, 1.6% in 2008, 1.4% in 2009, and 1.0% in 2010. Age, sex, registration type, tuberculosis type, and medication were independently associated with a relapse of TB. In the multivariate logistic regression analysis, the following factors were related: male sex, 40–49 years old; registration type, relapse, treatment after failure, treatment after default, transfer in, and other, the sputum smear-positive pulmonary TB, and medications (including individuals taking 2–5 drugs).

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Conclusion: This study has estimated a 5-year relapse rate of TB in Korea that is slightly lower than the rate of relapse TB in the annual reports. This study could be conducted and cross-checked with data from the National Health Insurance in the future.

1. Introduction

Tuberculosis (TB) is an infectious disease caused by *Mycobacterium tuberculosis*. It primarily infects the lungs, but it can also infect the digestive organs, lymph, and bones. Approximately 10% of the *M. tuberculosis*-infected people develop tuberculosis. The onset of tuberculosis is more frequent in men and tends to increase with aging. People with lower immunity, old age, diabetes; who use immunosuppressive drugs; and people with HIV/AIDS infection are more likely to develop tuberculosis [1].

Tuberculosis remains an important problem that threatens public health throughout the world, including Korea. Tuberculosis-infected people in Korea number an estimated 15 million, which is one-third of the total population [2]. Each year Korea witnesses 30,000–35,000 newly diagnosed cases of TB, which is the highest incidence among infectious diseases in Korea, and approximately 75,000 people are treated [3,4]. The World Health Organization (WHO) reports a TB incidence rate of 97 per 100,000 people in Korea, and Korea is among the intermediate burden countries [1].

Since 1962, Korea has begun to control TB on a national basis with its National Tuberculosis Control Plan. The national tuberculosis status survey has been conducted every 5 years since 1965 until 1995. During this period, the incidence rate has sharply decreased and the prevalence rate has also decreased from 5% to 1%

[2]. With a decrease of TB patients and low responding rate of the national survey, the national TB status has been identified on a report basis since 2000 [5]. The scale of TB patients has not been decreased, but remains steady [3,4] (Figure 1).

Deaths and the incidence rate caused by TB are also the highest among all infectious diseases. In fact, because of TB infection, Korea has the highest incidence and deaths among the 36 Organisation for Economic Co-operation and Development (OECD) countries and is 70th–90th among WHO member states [1]. The patients are mostly distributed in their 20–40s (40%), which is a typical aspect of developing countries. Tuberculosis in Korea was mostly controlled by public health centers, but private hospitals have gradually taken over this role since the mid-1990s, and above 85% of TB patients are treated and controlled in private hospitals since 2010 [3,4,6].

Tuberculosis relapse is divided into two classes: (1) a patient in whom the initial onset has been treated, but the existing *M. tuberculosis* reactivates into a second onset of TB; and (2) a patient with reinfection with new *M. tuberculosis* [7,8]. To distinguish between these two classes, genotyping is necessary but unfeasible for every patient. Korea does not identify these two classes [i.e., relapse (reactivated onset) and reinfection] [9]. The relapse rate differs by a country's incidence and control: 0–27% of TB relapses occur within 2 years after treatment completion and most relapses occur within 5

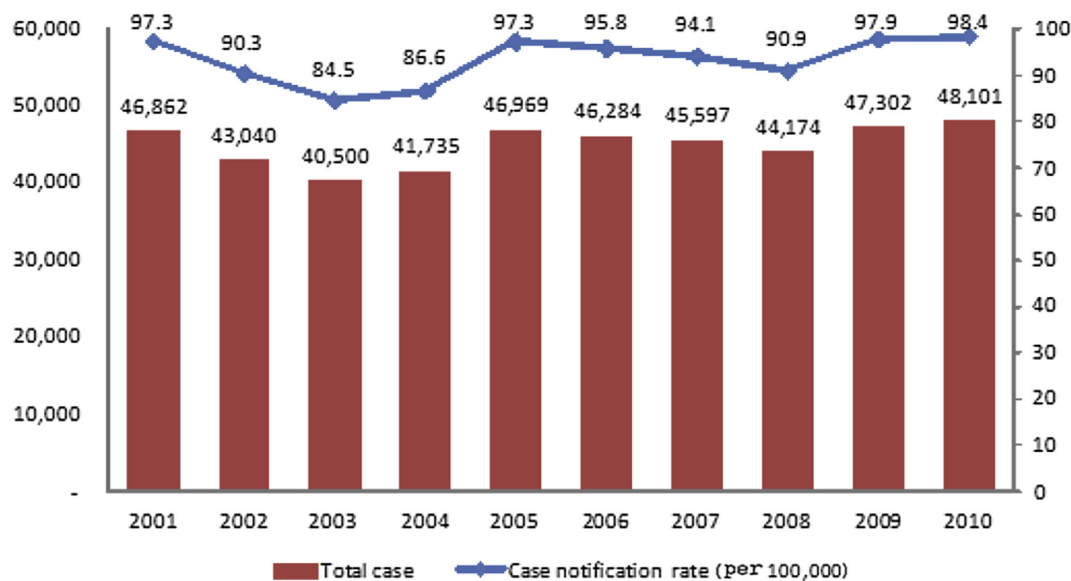


Figure 1. Number and rate of tuberculosis notification in 2001–2010.

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