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Abstract

Background: The COVID-19 pandemic has put a significant strain on human life and health care systems, however, little is known about its impact on tuberculosis (TB) patients.

Aims: To assess the impact of COVID-19 pandemic on pulmonary tuberculosis (PTB) diagnosis, treatment and patient outcomes, using the WHO definitions.

Methods: A cross-sectional study was conducted in Malatya region, Turkey (population 800 000). Data on regional PTB test numbers, case notification rates and PTB patients' clinical characteristics and treatment outcomes were collected. Data from the first pandemic year (2020) were compared to data from the previous 3 years (2017–2019). The attitudes and experiences of patients were analysed.

Results: Despite a non-significant 22% decrease in annual PTB case notifications (P = 0.317), the number of TB tests performed (P = 0.001) and PTB patients evaluated (P = 0.001)

decreased significantly during the pandemic year compared with the previous 3 years. The proportion of patients with high (3/4+) sputum acid-fast bacilli grades (P = 0.001), TB relapse (P = 0.022) and treatment failure (P = 0.018) increased significantly. The median 64.5-day treatment delay detected in 2017–2019 increased significantly to 113.5 days in 2020 (P = 0.001), due primarily to patients' reluctance to visit a health care facility.

Conclusion: In addition to the problems with case detection, this study shows notable deterioration in several indicators related to the severity, contagiousness and poor outcomes of TB, which had already been suppressed for decades.

Keywords: COVID-19, pulmonary tuberculosis, self-reported symptoms, predictors, sensitivity, specificity

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Introduction

Mycobacterium tuberculosis, one of the oldest pulmonary pathogens in humans, infects around one-third of the global population. An estimated 9.9 million new cases and more than 1.5 million deaths from tuberculosis (TB) were reported in 2021 (1). Because no effective TB vaccine exists, it is critical to control the disease through effective diagnosis and treatment as well as the elimination of the suboptimal living conditions that contribute to the spread and reactivation of TB. The End TB Strategy, led by the World Health Organization (WHO), aims to reduce TB-related deaths by 95% and disease incidence by 90% by 2035 through early diagnosis, treatment, collaboration and resource allocation (2).

Severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) is an emerging pulmonary pathogen that has caused a pandemic affecting the entire global population since the beginning of 2020. Data from WHO have shown that SARS-CoV-2 has infected more than 400 million people worldwide, resulting in around 5.5 million COVID-19 deaths as of January 2022 (3). Studies show that the frequency of some neuropsychiatric problems has increased, and quality of life and well-being have been negatively affected while living under pandemic conditions (4,5). Survivors of severe COVID-19 often require immune-suppressive medications and have experienced decreased B- and T-cell counts (6,7). Significant reductions in hospital admissions of patients with health problems other than COVID-19 have also occurred (8). The COVID-19 pandemic has imposed a significant workload on health care facilities, particularly in the departments of chest and infectious diseases, which are critical for TB diagnosis. Therefore, the COVID-19 pandemic has the potential to exacerbate TB burden on societies by negatively impacting health care systems in addition to its effects on personal and social well-being.

A WHO report indicates that substantial disruptions in TB services and case detection have occurred across the world since the beginning of the COVID-19 pandemic (9). A study conducted in the WHO European Region reported a decrease of more than one-third in TB case notifications in the second quarter of 2020 compared to the same period in 2019, and suggested that the deterioration in TB services due to the COVID-19 response may impede the region’s ability to meet the TB targets of the 2030 Sustainable Development Goals (10). Although similar declines in notifications have been reported in several countries, the details and dynamics of these reductions are not yet clear.

This study aimed to determine changes in diagnostic and treatment processes and treatment outcomes (according to WHO definitions) in patients diagnosed with pulmonary tuberculosis (PTB) in the first year (2020) of the COVID-19 pandemic.

Methodology

Study design, patients

A cross-sectional study was conducted in Malatya, a city located in mid-eastern Turkey with a population of 800 000 inhabitants. Patients in the region who were tested for and diagnosed with PTB between 1 January 2017 and 28 February 2021 were included in the study. Because the study aimed to evaluate the impact of the COVID-19 pandemic on the course of PTB annually, the first pandemic year was defined as the 1-year period from 1 March 2020 (the first COVID-19 case notification in Turkey) to 28 February 2021.

Any patient who was tested for and diagnosed with PTB during the study period and was a resident of the Malatya region was included in the study. Patients with PTB and who had

COVID-19 were included to determine the potential impact of this co-infection on the diagnosis and treatment processes and the outcomes of pulmonary tuberculosis. Patients who did not meet these criteria were excluded from the study. Because the COVID-19 pandemic did not impact Turkey's health care system until March 2020, patients diagnosed in January and February 2020 were excluded.

Patients who were tested for and diagnosed with PTB were identified by screening the data from the Public Health Tuberculosis Department of Malatya city and the TB diagnostic laboratory of the region located in the Turgut Ozal Medical Center, a tertiary-level health care facility at the Inonu University Medical Faculty.

This study was approved by the Ministry of Health (2021-01-11T13_01_23; 12 January 2021), the Malatya Clinical Studies Ethical Board (2021/38; 3 February 2021) and the Ministry of Health Malatya Office (04.21/771-1064; 20 April 2021).

Data sources and definitions

Demographic and medical data of patients tested for and diagnosed with PTB during the study period were collected from the electronic and paper records at the Public Health Tuberculosis Department, the Turgut Ozal Medical Center's TB diagnostic laboratory and the health care facilities where patients were evaluated. The WHO criteria were used to define PTB, relapse, clinically diagnosed TB and treatment outcomes (11).

A questionnaire was used to collect information from patients diagnosed during the pandemic year about their attitudes, behaviours and experiences with the TB diagnosis and treatment processes. The questionnaire had 8 questions with responses graded on a 5-point Likert scale ranging from "strongly disagree" to "strongly agree". The survey was conducted via phone or in-person interviews. In cases of mortality, juveniles, or mental incapacity, data were obtained from the primary caregiver.

Data analysis

The following data for PTB patients who were diagnosed in the region during the study period were collected and analysed: demographic data (age and sex) of the patients, the acid-fast bacilli (AFB) grades in smear samples, diagnostic features (clinical diagnosis/laboratory-based diagnosis), new case or relapse, comorbidities, treatment outcomes and duration from the onset of symptoms to the initiation of anti-TB treatment. Patients' data from the pre-pandemic (2017–2019) and pandemic (2020) periods were statistically compared.

Quantitative data were presented as median (minimum–maximum) and qualitative data as numbers (percentages). The interquartile range was calculated for the patients' ages. The conformity of quantitative data to the normal distribution was evaluated with the Shapiro–Wilk test. The one-sample chi-square, Mann–Whitney U, Kruskal–Wallis, Conover pairwise comparison and Pearson chi-square tests were used. The significance level was