Pulmonary Tuberculosis Screening in Diabetes Mellitus Patients at Klinik Cahaya Kemang

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Abstract

The relationship between Tuberculosis (TB) and Diabetes Mellitus (DM) is intricate and intertwined, posing significant global health challenges. In addition, the increasing prevalence of DM worldwide raises concerns regarding the potential resurgence of tuberculosis. The implementation of tuberculosis prevention strategies is of the most importance, especially in countries like Indonesia that encounter a dual burden of TB and DM. The significance of TB screening in private primary care settings for patients with diabetes cannot be overstated. Implementing TB screening protocols in private primary care settings can assist in identifying diabetic patients with tuberculosis. This study aims to evaluate the implementation and outcomes of pulmonary TB screening in DM patients at Cahaya Kemang Clinic throughout 2024. A retrospective descriptive study was conducted using secondary data from the Prolanis DM program and TB screening records at Cahaya Kemang Clinic from January to December 2024. A total of 7 DM patients were screened, and 1 (14.8%) case of pulmonary TB was confirmed by GeneXpert testing. Routine TB screening in DM patients is essential and effective in early detection and treatment of TB.

Keywords: Tuberculosis, Diabetes Mellitus, Screening, Primary Health Care, Klinik Cahaya Kemang

Introduction

TB is caused by the bacillus *Mycobacterium tuberculosis*, which is spread when people who are sick with TB expel bacteria into the air (e.g. by coughing[).(Kesehatan, 2025)] About a quarter of

the global population is estimated to have been infected with TB . Following infection, the risk of developing TB disease is highest in the first 2 years (approximately 5%), after which it is much lower . Some people will clear the infection . Of the total number of people who develop TB disease each year, about 90% are adults, with more cases among men than women.[Kesehatan & Indonesia, n.d.] The disease typically affects the lungs (pulmonary TB) but can affect other sites as well. Without treatment, the death rate from TB disease is high (about 50%) . With treatments currently recommended by WHO (a 4–6 months course of anti-TB drugs), about 85% of people with TB can be cured. Regimens of 1–6 months are available to treat TB infection.[Kesehatan & Indonesia, n.d.]

Tuberculosis (TB) become significant global public health problem. Despite efforts to control the disease, it remains a leading cause of death worldwide. TB was the world's second leading cause of death from a single infectious agent, after coronavirus disease (COVID-19), and caused almost twice as many deaths as HIV/AIDS. More than 10 million people continue to fall ill with TB every year.[Laporan Program Penanggulangan Tuberkulosis Tahun 2022 KEMENTERIAN KESEHATAN REPUBLIK INDONESIA TAHUN 2023, n.d.]

According to Global report TB 2023, The reported global number of people newly diagnosed with TB was 7.5 million in 2022. This is the highest number since WHO began global TB monitoring in 1995, above the pre-COVID baseline (and previous historical peak) of 7.1 million in 2019, and up from 5.8 million in 2020 and 6.4 million in 2021. India, Indonesia and the Philippines, which collectively accounted for a large share (≥60%) of the global reductions in the number of people newly diagnosed with TB in 2020 and 2021, all recovered to above 2019 levels in 2022.   In 2022, thirty high TB burden countries accounted for 87% ofthe world's TB cases and two-thirds of the global total was in eight countries: India (27%), Indonesia (10%), China (7.1%), the Philippines (7.0%), Pakistan (5.7%), Nigeria (4.5%), Bangladesh (3.6%) and the Democratic Republic of the Congo (3.0%). [Global Tuberculosis Report 2023, 2023]

In 2020, five key health-related risk factors for TB, namely, diabetes, human immunodeficiency virus (HIV), disorders due to alcohol use, tobacco smoking and undernutrition accounted for 4.5 million (45%) new and relapse TB episodes. These health-related risk factors are considered comorbidities when a person also has TB.. All these comorbid conditions are associated with poorer TB treatment outcomes and adverse socioeconomic impact. Moreover, people with TB may develop chronic lung disease, requiring care and rehabilitation after completing treatment for TB. [https://www.ncbi.nlm.nih.gov/books/NBK603416/, n.d.]

Diabetes mellitus is highly prevalent among patients with tuberculosis, particularly in several countries with double burden of both infectious disease such as tuberculosis and non-communicable disease like diabetes mellitus type 2. The increasing number of people with TB and DM can affect the relationship between the both diseases. Findings from TB and DM screening show that the prevalence of TB in individuals with DM and the prevalence of DM in those with TB varies between 2% and 35% for both conditions. TB and DM signify a dual burden and pose a public health issue, becoming an increasing concern in low and middle-income countries facing high TB rates, such as in Indonesia[Nugrahaeni et al., 2025]

Diabetes is associated with a two-to-three-fold risk of TB disease, and a higher risk of multidrug-resistant TB (MDR-TB). People with TB and diabetes are twice as likely to die during TB treatment, and have a four-fold risk of TB relapse after treatment completion . [Prakoso et al., 2023] In 2020, an estimated 369 000 new episodes of TB were attributable to diabetes, and in 2019 just over 15% of people with TB were estimated to have diabetes globally, compared with 9.3% among the general adult population (aged 20–79 years) . This equates to about 1.5 million people with TB and diabetes who required coordinated care and follow-up to optimize the management of both conditions. Diabetes is estimated to increase globally by 50% between 2019 and 2045, with a median increase of 99% (interquartile range [IQR]: 69–151%) in countries with a high burden of TB. [Framework for Collaborative Action on Tuberculosis and Comorbidities, n.d.] Meanwhile, according to International Diabetes Foundation throughout 2024, there are 20.426 total cases of diabetes in adullts, or 11.3 % prevalanece, from total adult population, so that Indonesia become is the fifth highest country in the world for diabetes cases.[Million, n.d.]

The high incidence of TB in diabetic patients has prompted the Ministry of Health to issue Circular Letter No. HK.02.02/C/1453/2024 on the Implementation of tuberculosis screening and management in people with diabetes mellitus in order to increase tuberculosis case finding in Indonesia, which aims to ensure that all people with DM can be screened for TB and if known to be positive for DM TB, they can be treated with Anti-Tuberculosis Drugs (OAT) and Anti-Diabetes Drugs (OAD) according to applicable standards.[2024sepp1453, n.d.] An important point in the circular letter is that there is an obligation for all health care facilities to conduct TB screening for every person with diabetes, as well as to conduct DM screening for every TB patient. According to the letter, TB screening methods in people with DM can use several methods as follows:

a. Parallel TB screening methods are symptom screening and chest radiography examination.

b. Sequential negative TB screening methods are negative symptom screening followed by chest radiography examination.

c. Single TB screening methods are TB symptom screening

d. In the implementation of TB screening in DM patients using the negative parallel or sequential screening method, chest radiography examination can be carried out at health service facilities (fasyankes) that have radiology services or through a referral mechanism.

Methode

A retrospective descriptive study was conducted using secondary data from Cahaya Kemang Clinic from January to December 2024. We identified the number of DM patients who received TB screening and their screening outcomes. The results were presented in proportions and descriptive statistics.

Data source was taken from *Prolanis DM patient list*, which includes demographic information of DM patients enrolled in the national chronic disease management program, and The *TB Suspected Case Registry (Register TBC.06)*, a national template recording suspected TB cases including demographic and clinical information.

Inclusion Criteria: All patients listed in the Prolanis DM registry for 2024. Patients from the DM list were matched with names in the TB register to determine whether they had been screened for TB. The match was based on patient name and age.

Discussion

Respondents in the study were patients who were already established as type II diabetes mellitus patients, had received diabetes mellitus treatment, and were registered in the PROLANIS program at the Cahaya Kemang Clinic. The characteristics of the respondents were dominated by women, as many as 65.2%, while male respondents were 34.8%. The age of the respondents, the youngest was 36 years old, and the oldest was 79 years old, with average age of 57.6. Of the total 66 patients diagnosed with diabetes mellitus, 7 patients (10.6%) underwent tuberculosis screening,

using the molecular rapid test method. Patients who underwent screening were patients who experienced symptoms of chronic cough, or cough for more than 2 weeks, , during examination by a doctor . Of the 7 DM patients who underwent TB screening using the molecular rapid test method, 1 patient (14.2%) was diagnosed with drug-sensitive TB (TB SO).

In the study about the incidence of new cases of pulmonary TB in patients with type 2 DM, was conducted by Himyatul Hidayah et al in 2022 at a private hospital in Cikampek. In that study, the incidence of new cases of pulmonary TB with type 2 DM was found to be 31.3%.[Himyatul Hidayah & Surya Amal, 2019] Another study that also discussed the correlation between type 2 diabetes mellitus and tuberculosis was also conducted by Fairuza Alziwinindya Batubara and Alamsyah in 2022, at the Haji General Hospital, Medan, where the study proved a positive correlation between type 2 diabetes mellitus and tuberculosis.[Sina et al., 2024]

Table 1.

Distribution of Respondent Characteristics

Variable	Kategori	Total		Persentage
Gender	Male		23	34.8%
	Female		43	65.2%
TB Screening Conducted	Yes		7	10.6%
	No		59	89.4%
Diagnosed TB	Yes		1	14.2%
	No		6	85.8%

Table 2

Age Distribution of Diabetes Mellitus Patients Registered in the Prolanis Program

Variable	mean	median	sd	min	max
Aged	57.6	57	10.36	36	79

Referring to the 2020 National Tuberculosis Service Guidelines, where every DM patient must be screened for TB by examining TB symptoms and chest X-rays. On the other hand, for TB patients, DM screening is carried out by examining fasting blood sugar and 2-hour postprandial blood sugar. [KEMENTERIAN KESEHATAN REPUBLIK INDONESIA, n.d.] This statement is reinforced by the circular of the Ministry of Health number HK.02.02 / C / 1453 / 2024 concerning the implementation of tuberculosis screening and management in people with diabetes mellitus in order to increase the discovery of tuberculosis cases in Indonesia.

However, what happened at the Cahaya Kemang Clinic, not all patients underwent tuberculosis screening. The obstacles faced were that there was still rejection and reluctance of patients to undergo screening. This can happen because there is still a negative stigma about TB, where TB is considered a "shameful" infectious disease, so that DM diabetes patients are reluctant to undergo further examination. As for other factors that influence the perception of DM patients towards TB screening, it is still not known for sure, so it requires further research.

According to the 2015 Consensus on TB-DM Management in Indonesia, TB screening for DM patients is carried out primarily by conducting a chest X-ray examination. If radiology facilities are not available at the first-level service facility, then the patient can be referred to a more advanced service facility, or another facility that has such services. [Konsensus-Nasional-TB-DM (1), n.d.] This has not been fully implemented due to financial constraints. Not all patients are willing to undergo a chest X-ray examination at their own expense, while to carry out the referral process through the JKN flow, clinics as first-level health facilities are constrained by JKN regulations regarding the limitations on the number and cases of referrals, so patient screening still uses molecular rapid tests. For this reason, a special policy is needed regarding the flow of chest X-ray examinations and financing.

Of the 7 DM patients who underwent TB screening using the molecular rapid test method, 1 patient (14.2%) was diagnosed with drug-sensitive TB (TB SO), and the remaining 6 people (85.8%) had negative results, but further examination is still needed to ensure whether the patient is truly not infected with TB. Similar research on a larger scale was conducted by Vidya Mave et al in India, which discussed Tuberculosis screening among persons with diabetes mellitus in Pune, India. In the study, the participation rate of type 2 diabetes mellitus patients in tuberculosis screening was very low, which was around 18%. The study also used symptom-based screening

as well as GenXpert and microbiology examinations. Of the total respondents with TB symptoms, not one was bacteriologically positive for TB.[(Mave et al., 2017)]

This study has several limitations, including the absence of specific respondent characteristic data, related to education level, economy, so it is still unknown what factors might influence the perception and low participation of DM patients in tuberculosis screening. The screening method in this study also still uses a molecular rapid test (GenXpert), so it can only detect drug-sensitive TB cases. Meanwhile, in patients with diabetes mellitus, drug-resistant TB (TB RO) can occur, and is often not detected by the molecular rapid test method (GenXpert).

Conclusion

- The relationship between TB and DM is significant and complex, with DM patients having a 2–3 times higher risk of developing TB, including a higher risk of drug-resistant TB and relapse after treatment.

- This study found that out of 66 DM patients at Cahaya Kemang Clinic, only 7 (10.6%) underwent TB screening. Among them, 1 person (14.2%) tested positive for TB using the GeneXpert method.

- The low screening rate was influenced by barriers such as TB stigma, patient reluctance, and limitations in facilities and financing for chest X-ray examinations.

- The screening method applied still does not fully align with national guidelines, as it relies more on molecular rapid tests rather than chest X-rays due to cost constraints and referral system limitations under BPJS.

Recommendations

- Increase education and awareness among DM patients about the importance of regular TB screening to reduce stigma and improve participation.

- Establish supportive policies for financing chest X-ray examinations, either through JKN schemes or local government subsidies, to enable the implementation of standard screening methods.

- Promote cross-sector collaboration between health facilities, BPJS, and the health department to develop an effective and efficient referral and financing system.

- Conduct further research to explore the underlying factors affecting the low participation rate of DM patients in TB screening, to design more targeted interventions.

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