

Letter to the editors



Profile of tuberculosis patients with comorbid diabetes mellitus in Medan, Indonesia: a cross-sectional study

 Rina Amelia, Isti Ilmiati Fujiati, Dharma Lindarto, Em Yunir, Hari Kusnanto

Corresponding author: Rina Amelia, Department of Community Medicine, Faculty of Medicine, Universitas Sumatera Utara, Medan, Indonesia. rina2@usu.ac.id

Received: 25 Jul 2022 - **Accepted:** 11 Aug 2024 - **Published:** 24 Oct 2024

Keywords: Tuberculosis, comorbid diabetes mellitus, blood glucose levels, lipid profile, chronic complications

Copyright: Rina Amelia et al. Pan African Medical Journal (ISSN: 1937-8688). This is an Open Access article distributed under the terms of the Creative Commons Attribution International 4.0 License (<https://creativecommons.org/licenses/by/4.0/>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Cite this article: Rina Amelia et al. Profile of tuberculosis patients with comorbid diabetes mellitus in Medan, Indonesia: a cross-sectional study. Pan African Medical Journal. 2024;49(54). 10.11604/pamj.2024.49.54.36492

Available online at: <https://www.panafrican-med-journal.com//content/article/49/54/full>

Profile of tuberculosis patients with comorbid diabetes mellitus in Medan, Indonesia: a cross-sectional study

Rina Amelia^{1,&}, Isti Ilmiati Fujiati¹, Dharma Lindarto², Em Yunir³, Hari Kusnanto⁴

¹Department of Community Medicine, Faculty of Medicine, Universitas Sumatera Utara, Medan, Indonesia, ²Department of Internal Medicine, Faculty of Medicine, Universitas Sumatera Utara, Medan, Indonesia, ³Department of Internal Medicine, Faculty of Medicine, Universitas Indonesia, Jakarta, Indonesia, ⁴Department of

Public Health Faculty of Medicine, Universitas Gadjah Mada, Yogyakarta, Indonesia

[&]Corresponding author

Rina Amelia, Department of Community Medicine, Faculty of Medicine, Universitas Sumatera Utara, Medan, Indonesia

To the editors of the Pan African Medical Journal

Tuberculosis (TB) is a neglected disease and poses a greater risk in vulnerable socioeconomic groups and people with other diseases, such as HIV, alcoholism, chronic lung disease, cancer, malnutrition, and diabetes mellitus (DM) [1]. Diabetes mellitus is known to be a critical comorbid in the development of TB. Patients who have DM are at 2-3 times higher risk of developing TB than those who do not have DM. Studies conducted in different parts of the world show that 12-44% of TB diseases are related to DM [2]. In Indonesia, TB became the second-highest cause of death after stroke and the number one killer among infectious diseases. As mentioned before, people with DM are at a higher risk of developing TB than those without DM. Research shows that in countries with an increasing prevalence of DM, the prevalence of TB is also increasing. Tuberculosis and DM are among the top 10 leading causes of death in lower-middle-income countries. The health burden due to TB will keep on increasing, concerning the increasing prevalence of DM [3].

The relationship between DM and TB is a fundamental challenge in global TB control; patients with both conditions can show a high rate of TB treatment failure, increasing the risk of relapsing and even death. TB with DM may develop resistance to drugs utilized [4]. Because of their immune dysfunction, people with DM are more likely to contract new tuberculosis infections and reactivate the disease, develop active disease, and experience poor treatment outcomes [5]. Diabetes mellitus directly impairs the innate and adaptive immune responses required to fight the progression from infection to clinical manifestation. The link between DM and TB is supported by DM patients' cell-mediated immune disorders, kidney failure, micronutrient deficiency, and pulmonary microangiopathy, all of which increase their susceptibility to developing TB [6,7]. Thus, with the aforementioned explanation, this study aimed to find out the prevalence of TB with

comorbid DM, and it was constructed based on age and gender in Medan, Indonesia.

The research was conducted at 77 primary health care facilities in Medan and it obtained a number of 762 TB patients with DM comorbidity. The highest number of TB with DM cases was found in Advent General Hospital and Medan Johor Primary Health Care (PHC), with as many as 43 cases, followed by 35 cases in Pulmonary Specialist Hospital, 30 in Belawan PHC, 29 in Amplas PHC, and 21 in Helvetia PHC.

Table 1 shows a total of 762 patients, 523 (68.6%) were male and only 239 (31.43%) were female. The most prevalent ages fell in the ages of 45-54 years, accounting for 271 (35.6%) respondents, followed by the age group of 55-64 years for 229 (30.1%), and the age group of 35-44 years for 134 (17.6%). Meanwhile, the least ages were in the age group of 0-4 years for only one patient and no TB patient was aged 5-14 years old. From several Asian studies, the prevalence of DM with TB coinfection was between 5-50%, with the incidence rates in DM patients increasing 1.8-9.5 times higher than those in the general population [7].

The majority of TB patients with comorbid DM were male (68.6%). This result is in line with Alebel *et al.* in India, who reported higher TB incidence with DM in male patients; of 300 patients, 183 (61%) were men, and 117 (39%) were women [7]. However, other studies stated that DM patients were dominated by women (58.3% in Asia and 54.1% in Africa) [7], while another showed no significant differences between men and women [8].

Diabetes may also increase the number of *Mycobacterium tuberculosis* bacteria and extend the time for negative BTA conversion. As many as 50% of patients with TB and diabetes remained positive on evaluation culture results in months 2-3 compared to those without DM. Some studies have also shown that diabetes mellitus may worsen TB treatment outcomes, specifically

increasing the risk of death during TB treatment by as many as two times compared to patients without DM. Cases of TB with DM are also associated with an increased risk of cardiovascular complications and higher mortality in the first few months of TB treatment [8]. Some studies showed that the impact of diabetes on TB was that TB therapy tended to fail, and sufferers were less likely to die during therapy than non-diabetics [9].

Given the increasing worldwide DM epidemic, it is necessary to add DM prevention and control strategies to TB control programs and vice versa and to evaluate their effectiveness. The similarity of the two diseases can carry a risk of global spread, with severe implications for TB control.

Conclusion

Screening for TB patients to find out comorbid DM is highly recommended for the eradication of TB treatment and sputum conversion and also to ensure diabetes control.

Competing interests

The authors declare no competing interests.

Funding

The Research Institute of Universitas Sumatera Utara funded this research. Research Implementation Contract of the Indonesian Collaborative Research Program, Universitas Sumatera Utara fiscal year 2021 (Contract number: 4206/UN5.1. R/PPM/2021, February 25, 2021).

Authors' contributions

This work was carried out in collaboration between all authors. Rina Amelia and Isti Ilmiati Fujiati: study design, data collector, statistical analysis, data interpretation, manuscript preparation, literature search, and funds collection. Dharma Lindarto, Em Yunir, Hari Kusnanto: statistical analysis, manuscript

preparation, study design, data interpretation manuscript preparation, literature search. All the authors have read and agreed to the final manuscript.

Table

Table 1: frequency distribution of tuberculosis with comorbid type 2 diabetes mellitus by gender and age group

References

1. Pereira SM, Araujo GS, Santos CA, Oliveira MG, Barreto ML. Association between diabetes and tuberculosis: Case-control study. *Rev Saude Publica*. 2016 Dec 22;50: 82. **PubMed** | **Google Scholar**
2. Lee PH, Fu H, Lai TC, Chiang CY, Chan CC, Lin HH. Glycemic control and the risk of tuberculosis: a cohort study. *PLoS Med*. 2016 Aug 9;13(8): e1002072. **PubMed** | **Google Scholar**
3. Young F, Critchley JA, Johnstone LK, Unwin NC. A review of co-morbidity between infectious and chronic disease in Sub Saharan Africa: TB and diabetes mellitus, HIV and metabolic syndrome, and the impact of globalization. *Global Health*. 2009 Sep 14;5: 9. **PubMed** | **Google Scholar**
4. Jeon CY, Murray MB. Diabetes mellitus increases the risk of active tuberculosis: a systematic review of 13 observational studies. *PLoS Med*. 2008 Jul 15;5(7): e152. **PubMed** | **Google Scholar**
5. Hoa NB, Phuc PD, Hien NT, Hoa VQ, Thuong PH, Anh PT, Nhung NV. Prevalence and associated factors of diabetes mellitus among tuberculosis patients in Hanoi, Vietnam. *BMC Infect Dis*. 2018 Nov 29;18(1): 603. **PubMed** | **Google Scholar**

6. Oo MM, Tassanakijpanich N, Phyu MH, Safira N, Kandel S, Chumchuen K *et al.* Coverage of tuberculosis and diabetes mellitus screening among household contacts of tuberculosis, patients: a household-based cross-sectional survey from Southern Thailand. BMC Public Health. 2020 Jun 18;20(1): 957 **PubMed** | **Google Scholar**
7. Alebel A, Wondemagegn AT, Tesema C, Kibret GD, Wagnew F, Petrucka P *et al.* Prevalence of diabetes mellitus among tuberculosis patients in Sub-Saharan Africa: a systematic review and meta-analysis of observational studies. BMC Infect Dis. 2019 Mar 13;19(1): 254. **PubMed** | **Google Scholar**
8. Eruva V, Samuel CJ, Singh S. Collision of two epidemics: prevalence of diabetes in tuberculosis patients in urban Ludhiana. International Journal of Community Medicine and Public Health. 2020;7(4): 1342-1346. **Google Scholar**
9. Mihardja L, Lolong DB, Ghani L. Prevalensi Diabetes Melitus pada Tuberkulosis dan Masalah Terapi. Jurnal Ekologi Kesehatan. 2015;14(4): 350-8. **Google Scholar**

Table 1: frequency distribution of tuberculosis with comorbid type 2 diabetes mellitus by gender and age group

Demographic Characteristics	Frequency	Percentage (%)
Male (n=523)		
0-4	0	0
5-14	0	0
15-24	8	1.5
25-34	21	4.0
35-44	98	18.7
45-54	188	35.9
55-64	150	28.7
≥65	58	11.1
Women (n=239)		
0-4	1	0.4
5-14	0	0
15-24	2	0.8
25-34	10	4.2
35-44	36	15.1
45-54	83	34.7
55-64	79	33.1
≥65	28	11.7