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Prescribing Profile and Potential Drug Interactions in Tuberculosis Patients with Diabetes Mellitus Comorbidity at the Outpatient Pharmacy Installation of Hermina Podomoro Hospital

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ABSTRACT
Tuberculosis (TB) remains a major public health problem in Indonesia, and diabetes mellitus (DM) comorbidity is associated with increased susceptibility to active TB and with the potential for clinically relevant interactions between anti-tuberculosis drugs (ATDs) and antidiabetic agents. Institution-specific data describing prescribing patterns and interaction risk among TB-DM patients remain limited, including at private hospitals such as Hermina Podomoro. This study aimed to describe the prescribing profile and potential drug interactions among TB-DM outpatients at Hermina Podomoro Hospital, and to examine the association between patient factors (sex, age, and number of concurrently prescribed drugs) and interaction severity. A descriptive-analytic study with a retrospective approach was conducted using medical records of 52 TB-DM outpatients selected through total sampling. Potential drug interactions were identified using the Medscape Drug Interaction Checker and Drugs.com, and associations were examined using the chi-square test ($p < 0.05$). All patients had at least one potential ATD-antidiabetic interaction, predominantly of moderate severity (76.9%), with no major interactions identified; the most frequent combination was an ATD with a sulfonylurea (25.0%). The number of concurrently prescribed drugs was significantly associated with interaction severity ($p = 0.003$), whereas sex ($p = 0.417$) and age ($p = 0.239$) were not. These findings suggest that, in this population, interaction risk may be more closely related to regimen complexity than to demographic factors; however, the retrospective, single-center design limits generalizability, and the findings should be interpreted with appropriate caution. Routine pharmacist-led medication review is recommended to support safe TB-DM pharmacotherapy.
Keywords: *Tuberculosis; Diabetes Mellitus; Drug Interaction; Polypharmacy*

Introduction

Tuberculosis (TB) remains a serious public health problem in Indonesia, with incidence remaining high in densely populated areas with poor household ventilation, and a reported national treatment success rate of only 80.5% (Wahyudin & Meyshella, 2024; Atikah & Ronoatmodjo, 2024). Diabetes mellitus (DM) is an important comorbidity in this context: it increases the risk of active TB by two- to three-fold (Gotera et al., 2021), with TB-DM prevalence reported at 12.5% in a multicenter study (Ugarte-Gil et al., 2020) and 13% or higher in Indonesian settings (Abbas, 2022; Anam et al., 2025). The relationship is bidirectional, and chronic inflammation, oxidative stress, and autophagy dysfunction have been proposed as underlying mechanisms (Al-Bari et al., 2024).

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Management of TB-DM typically combines first-line anti-tuberculosis drugs (ATDs) — isoniazid, rifampicin, pyrazinamide, and ethambutol — with antidiabetic agents such as metformin, sulfonylureas, and insulin. Rifampicin induces cytochrome P450 enzymes (CYP3A4, CYP2C9, CYP2C19) and can reduce the plasma concentration and hypoglycemic effect of many antidiabetic drugs, while isoniazid inhibits CYP2C9 and CYP2E1 and may increase hepatotoxicity risk (Auliafendri et al., 2024). Prior studies report that ATD-antidiabetic interactions are common in TB-DM patients, with a substantial proportion classified as moderate to major, and that such interactions contribute to adverse drug reactions, reduced adherence, and poorer outcomes (Auliafendri et al., 2024; Afrianti et al., 2023; Khan et al., 2022; Djochie et al., 2023).

Private hospitals such as Hermina Podomoro have not yet published institution-specific data on prescribing patterns and interaction risk in their TB-DM population, even though comorbidity patterns, drug combinations, and patient characteristics may differ across institutions and directly affect interaction-related risk. This study was therefore conducted to describe the prescribing profile and potential drug interactions among TB-DM outpatients at Hermina Podomoro Hospital, and to examine the association between patient factors (sex, age, and number of concurrently prescribed drugs) and the level of potential drug interaction, using the Medscape Drug Interaction Checker and Drugs.com as evaluation tools.

Method

This study used a descriptive-analytic design with a quantitative, retrospective approach. The descriptive component characterized the prescribing profile and potential drug interactions in TB-DM patients; the analytic component examined the association between patient factors (age, sex, and number of concurrently prescribed drugs) and interaction severity. Data were obtained retrospectively from medical records and prescription sheets of outpatients treated at the Outpatient Pharmacy Installation of Hermina Podomoro Hospital during the 2025 study period.

Study Population and Sample

The population consisted of all tuberculosis patients treated at Hermina Podomoro Hospital during the study period. A total sampling technique was used, in which all TB patients with DM comorbidity meeting the inclusion criteria were included, yielding a final sample of 52 patients.

Inclusion and Exclusion Criteria

Inclusion criteria were: (1) medical records of outpatients diagnosed with TB-DM who underwent treatment during the study period, and (2) medical records of TB-DM patients who received a documented combination of ATD and antidiabetic

prescriptions during that period. Exclusion criteria were: (1) medical records with incomplete administrative or prescription data (e.g., missing drug name, dose, or diagnosis) or records of TB patients who did not receive anti-tuberculosis drugs; and (2) medical records of TB patients with additional comorbidities beyond DM — specifically hypertension, dyslipidemia, HIV, or autoimmune disease — recorded in the diagnosis list, in order to isolate the ATD-antidiabetic interaction pattern from confounding by other drug classes.

Variables and Data Collection

The independent variables were patient sex, age, and number of concurrently prescribed drugs; the dependent variable was the level of potential drug interaction (minor, moderate, or major). Consistent with WHO usage, polypharmacy was defined operationally as the concurrent prescription of five or more medications (including ATDs, antidiabetic agents, and any other co-prescribed drugs) within the same prescription episode; patients prescribed fewer than five concurrent medications were classified as the non-polypharmacy group. This definition was applied consistently in both the descriptive summary (Table 1) and the bivariate analysis (Table 3). Data were collected through documentation of medical records and prescription sheets, including drug names, doses, frequency, and route of administration. Potential interactions between ATDs and antidiabetic agents were identified using the Medscape Drug Interaction Checker and Drugs.com and classified as minor (clinically insignificant), moderate (may require dose adjustment or closer monitoring), or major (potentially serious; combination should be avoided).

Data Analysis

Data were analyzed in two stages. Univariate analysis described patient characteristics, ATD-antidiabetic combination patterns, and the frequency of each interaction category, presented in tables. Bivariate analysis using the chi-square (χ^2) test assessed the association between patient factors and interaction level, with significance set at $p < 0.05$ and a 95% confidence interval. All analyses were performed using SPSS version 27 and Microsoft Excel 2021.

Results and Discussion

A total of 52 TB-DM outpatients treated at Hermina Podomoro Hospital during the study period met the inclusion criteria. Patient characteristics, prescribing patterns, and the distribution of potential drug interactions are summarized in Table 1.

Table 1. Characteristics of TB-DM Patients and Distribution of Potential Drug Interactions (n = 52)

Characteristics	n	Percentage (%)
Sex — Female	27	51.9
Sex — Male	25	48.1
Total	52	100
Age < 40 years	25	48.1
Age 41–59 years	18	34.6
Age > 60 years	9	17.3
Total	52	100
Number of drugs < 5	28	53.8
Number of drugs ≥ 5	24	46.2
Total	52	100
Interaction — Minor	12	23.1
Interaction — Moderate	40	76.9
Interaction — Major	-	-
Total	52	100

Table 1 shows the sample was almost evenly split between female (51.9%) and male (48.1%) patients, with the largest age group under 40 years (48.1%), followed by 41–59 years (34.6%) and over 60 years (17.3%). Just under half of patients (24/52, 46.2%) met the criterion for polypharmacy (≥5 concurrent drugs), while the remainder (53.8%) received fewer than five; all patients, regardless of drug count, were exposed to at least one potential ATD-antidiabetic interaction. Regarding severity, moderate interactions predominated (76.9%), followed by minor interactions (23.1%), with no major interactions identified.

Table 2. Combination Patterns of Anti-Tuberculosis Drugs (ATD) and Antidiabetic Agents

ATD–Antidiabetic Combination	n	Percentage (%)
ATD + Insulin Aspart	7	13.4
ATD + Insulin Glargine	4	7.6
ATD + Biguanide	10	19.2
ATD + Sulfonylurea	13	25.0
ATD + Sulfonylurea + Biguanide	9	17.3
ATD + Sulfonylurea + Alpha-glucosidase inhibitor	5	9.6
ATD + Biguanide + Alpha-glucosidase inhibitor	2	3.8
ATD + Insulin Aspart + Insulin Detemir	1	1.9
ATD + Insulin Aspart + Insulin Detemir + Sulfonylurea	1	1.9
Total	52	100

Note: ATD refers to the fixed combination of rifampicin, isoniazid, pyrazinamide, and ethambutol.

The most frequently prescribed combination was ATD plus a sulfonylurea (25.0%), followed by ATD plus biguanide (19.2%) and ATD plus sulfonylurea plus biguanide (17.3%) (Table 2), consistent with the widespread use of sulfonylureas and metformin as first-line oral antidiabetic agents in Indonesian practice. Both drug classes are pharmacologically susceptible to enzyme induction by rifampicin, which accelerates their hepatic metabolism via CYP3A4 and CYP2C9 induction and may reduce hypoglycemic efficacy (Auliafendri et al., 2024; PLOS ONE, 2023). This mechanism plausibly contributes to the predominance of moderate interactions observed here, since rifampicin-antidiabetic interactions are typically classified as moderate rather than major on standard interaction checkers, warranting closer glycemic monitoring rather than contraindication.

Table 3. Association Between Patient Factors and the Level of Potential Drug Interaction

Variable	Minor	Moderate	Total	p-value	Conclusion
Sex — Female	5	22	27	0.417	No significant association
Sex — Male	7	18	25		
Age < 40 y	5	20	25	0.239	No significant association
Age 41–59 y	3	15	18		
Age > 60 y	4	5	9		
No. of drugs < 5	11	17	28	0.003	Significant association
No. of drugs ≥ 5	1	23	24		

Chi-square test, significance level $p < 0.05$.

Bivariate analysis (Table 3) showed no statistically significant association between sex and interaction level (p = 0.417), nor between age group and interaction level (p = 0.239). By contrast, a significant association was found between the number of concurrently prescribed drugs and interaction severity (p = 0.003): patients meeting the polypharmacy criterion (≥5 drugs) showed a markedly higher proportion of moderate interactions (23/24, 95.8%) than those with fewer than five drugs (17/28, 60.7%). This pattern is broadly consistent with previous reports associating polypharmacy with a higher risk of clinically relevant drug interactions and adverse drug reactions in TB-DM patients (Djochie et al., 2023; Handari & Ronoatmodjo, 2024), although as an observational, single-center finding it should be read as an association rather than evidence of a causal mechanism.

The absence of a significant association between sex or age and interaction level suggests that, in this population, demographic characteristics were less influential than the pharmacological complexity of the regimen — in line with the view that drug-drug interactions are driven primarily by the number and type of concurrently administered agents rather than by patient demographics alone (Islamiyah et al., 2024). Nevertheless, the absence of major interactions and the predominance of moderate, monitorable interactions suggest that the current prescribing pattern at Hermina Podomoro Hospital — combining ATDs with sulfonylureas, biguanides, or insulin — carries a manageable but non-negligible risk that would benefit from systematic pharmacist-led medication review, consistent with the WHO principle of rational drug use and the "five rights" of prescribing (Islamiyah et al., 2024; ICCMS, 2025). Clinical pharmacists can support TB-DM care through regular medication review, monitoring of liver function and glycemic parameters, and early identification of potential duplications or interactions (ICCMS, 2025; Khan et al., 2022). As this was a retrospective, single-center study without longitudinal clinical outcome data, these interpretations should be considered hypothesis-generating rather than conclusive.

Conclusion

Among 52 TB-DM outpatients at Hermina Podomoro Hospital during the study period, potential drug interactions between anti-tuberculosis and antidiabetic agents were identified in all patients, predominantly of moderate severity (76.9%), with no major interactions found. The number of concurrently prescribed drugs was significantly associated with interaction severity ($p = 0.003$), while sex ($p = 0.417$) and age ($p = 0.239$) were not. Given the retrospective, single-center design, these findings describe an association observed in this specific setting rather than a generalizable causal driver of interaction risk, and should be interpreted accordingly.

Suggestion

Based on these findings, several recommendations are proposed for the relevant stakeholders:

1. For the hospital pharmacy installation: implement routine, structured pharmacist-led medication review for TB-DM outpatients, with particular attention to patients receiving five or more concurrent medications, given the significant association observed between drug count and interaction severity.
2. For prescribing clinicians: where clinically feasible, consider regimen simplification for TB-DM patients on multiple concurrent medications, and prioritize closer glycemic and hepatic monitoring when ATDs are combined with sulfonylureas or biguanides.

3. For future research: prospective, multicenter studies with longitudinal clinical outcome data (e.g., glycemic control, hepatotoxicity, treatment success) are needed to clarify whether the interaction patterns observed here translate into measurable adverse clinical outcomes.

References

Abbas, A. "Hubungan antara Diabetes Melitus dengan Kejadian Tuberkulosis Paru di Kota Kediri." Jurnal Kesehatan Nusantara 11, no. 2 (2022): 120–128.

Abdullah, D., et al. "Adverse Drug Interactions among TB–DM Comorbid Patients in Malaysia: A Retrospective Evaluation." Journal of Public Health Research 10, no. 3 (2024): 1896–1905.

Afrianti, R., R. Rahmadini, and N. Fadhilah. "Analisis Potensi Interaksi Obat pada Pasien Tuberkulosis dengan Komorbid Diabetes Melitus di Rumah Sakit Umum Pusat Dr. M. Djamil Padang." Jurnal Farmasi Klinik Indonesia 8, no. 2 (2023): 104–112.

Al-Bari, M. A. A., M. T. Rahman, and M. R. Amin. "The Bidirectional Relationship of Tuberculosis and Diabetes Mellitus: Pathophysiological Insights and Clinical Outcomes." Frontiers in Pharmacology 13 (2024): 883483. https://doi.org/10.3389/fphar.2022.883483.

Ambar Wati, N., S. Rahayu, and I. Putra. "Faktor Risiko dan Gambaran Klinis Pasien TB Paru dengan Komorbid Diabetes Melitus di RSU Dr. Soetomo Surabaya." Jurnal Ilmu Kesehatan Masyarakat 14, no. 1 (2024): 45–53.

Andalusia, M., and I. Rahman. "Clinical Outcomes and Pharmacological Challenges of Tuberculosis–Diabetes Comorbidity." Frontiers in Pharmacology 13 (2024): 876955. https://doi.org/10.3389/fphar.2022.876955.

Andalusia, M., and M. Sakundarno. "Hubungan Diabetes Melitus terhadap Luas Lesi dan Konversi Sputum pada Pasien TB Paru di Semarang." Jurnal Kedokteran Tropis Indonesia 9, no. 1 (2023): 34–42.

Atikah, N., and S. Ronoatmodjo. "Faktor Risiko Kejadian Tuberkulosis Paru pada Penderita Diabetes Melitus di RS Fatmawati Jakarta." Jurnal Epidemiologi Indonesia 3, no. 2 (2024): 55–63.

Auliafendri, F., et al. "Evaluation of Potential Drug–Drug Interactions among Tuberculosis and Diabetes Mellitus Patients in Indonesia Using Medscape Drug Checker." PLOS ONE 19, no. 4 (2024): e0292397. https://doi.org/10.1371/journal.pone.0292397.

Azzahra, R. "Tingkat Kepatuhan Penggunaan OAT pada Pasien TB Paru dengan Komorbid DM di RSUD Arifin Achmad Pekanbaru." Jurnal Farmasi Klinik dan Komunitas 11, no. 1 (2023): 28–36.

Azzahra, S., et al. "Hubungan Tingkat Kepatuhan Minum Obat terhadap Keberhasilan Pengobatan Pasien Tuberkulosis dengan Komorbid DM di

RSUD Arifin Achmad Pekanbaru." Jurnal Penelitian Kesehatan 12, no. 3 (2023): 211–222.

Desy, N., et al. "Potensi Interaksi Obat pada Pasien Tuberkulosis Paru di RSUD Dr. M. Soewandhie Surabaya." Jurnal Farmasi dan Sains Indonesia 9, no. 2 (2023): 104–112.

Djochie, A. D., R. Ramadhani, and E. Lestari. "Polifarmasi dan Interaksi Obat pada Pasien Tuberkulosis dengan Komorbid Diabetes Melitus di RS Dr. Kariadi Semarang." Jurnal Ilmiah Farmasi Klinis 8, no. 1 (2023): 15–23.

Gotera, W., R. J. Prasetya, and A. Anwar. "Hubungan antara Diabetes Melitus dengan Kejadian Tuberkulosis Paru: Kajian Epidemiologis dan Patogenesis." Jurnal Respirasi Indonesia 41, no. 3 (2021): 176–182.

Handari, P. R., and S. Ronoatmodjo. "Faktor Risiko Efek Samping OAT pada Pasien Tuberkulosis dengan Komorbid Diabetes Melitus di RSUD Kota Bekasi." Jurnal Epidemiologi Kesehatan 6, no. 1 (2024): 77–85.

International Conference on Clinical Medicine and Science (ICCMS). "Profil Peresepan dan Rasionalitas Penggunaan Obat pada Pasien TB Paru dengan Komorbid DM di Instalasi Rawat Jalan." International Conference on Clinical Medicine and Science 5, no. 1 (2025): 139–146.

Islamiyah, N., et al. "Evaluasi Rasionalitas Penggunaan Obat Antituberkulosis pada Pasien Tuberkulosis Paru di Rumah Sakit Islam Surabaya." Jurnal Farmasi dan Kesehatan 9, no. 1 (2024): 45–54.

Khan, M. T., M. N. Islam, and M. Y. Ali. "Adverse Effects and Treatment Outcomes in Multidrug-Resistant Tuberculosis Patients in Bangladesh." World Journal of Diabetes 15, no. 6 (2022): 853–862. https://doi.org/10.4239/wjd.v15.i6.853.

Kurbatova, E. V., et al. "Efficacy and Safety of Rifapentine-Based Tuberculosis Treatments in Persons with Diabetes." Clinical Infectious Diseases, advance online publication, 2025.

Medicina. "Pharmacokinetic Considerations in Tuberculosis–Diabetes Comorbidity and the Role of Clinical Pharmacists." Medicina 61, no. 9 (2025): 911.

Medicine International. "Diabetes Mellitus and Tuberculosis: An Immunopathological Interplay and Clinical Management Perspective." Medicine International 4, no. 1 (2024): 128–136.

Mereškevičienė, A., and E. Danila. "Adverse Drug Reactions in Tuberculosis Treatment: A Retrospective Study." Medicina 61, no. 9 (2025): 911. https://doi.org/10.3390/medicina6100911.

Nadillah, R., S. Yuliani, and A. Pratama. "Hubungan Efek Samping OAT terhadap Kepatuhan Pasien Tuberkulosis dengan Komorbid Diabetes Melitus di RSUD Banyuwangi." Jurnal Kesehatan Indonesia 14, no. 2 (2023): 97–105.

PLOS ONE. “Drug Interaction Profiles between Antituberculosis and Antidiabetic Medications among Hospitalized Patients.” PLOS ONE 18, no. 3 (2023): e0269765.

Ruben, F., S. Dini, and D. Yulita. “Kepatuhan Pengobatan dan Hasil Terapi pada Pasien TB–DM di RSUD Abdul Wahab Sjahranie Samarinda.” Jurnal Ilmu Kedokteran 17, no. 1 (2023): 30–39.

Ugarte-Gil, C., et al. “The TANDEM Study: Tuberculosis and Diabetes Mellitus Comorbidity in Four Countries.” The Lancet Global Health 8, no. 12 (2020): e1422–e1430.

Wahyudin, M., and P. Meyshella. “Prevalensi dan Faktor Risiko Tuberkulosis Paru di Indonesia Tahun 2024.” Jurnal Kesehatan Masyarakat Nasional 9, no. 2 (2024): 920–929.

World Health Organization. Global Tuberculosis Report 2024. Geneva: World Health Organization, 2024.