

Overview of The Results of Tuberculosis (TB) Examination with Molecular Rapid Test (TCM) at X Hospital in Gamping Regency, 2023-2024

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Abstract

Introduction: Tuberculosis (TB) is a significant global health problem, including in Indonesia. In the Special Region of Yogyakarta, TB prevalence is quite high, with a higher incidence among men than women. The Molecular Rapid Test (TCM) method using the GeneXpert MTB/RIF machine has been recommended by the World Health Organization as a fast and accurate diagnostic tool to detect the presence of Mycobacterium tuberculosis as well as resistance to rifampicin. **Objective:** This study aims to describe the results of TCM examinations in TB patients at X Gamping Hospital during the period 2023-2024 and to analyze the influence of age and gender on the examination result. **Method:** The study used a cross-sectional retrospective design with secondary data collection from the medical records of patients undergoing GeneXpert TCM examination. **Result and Discussion:** The results showed that the majority of patients were in the productive age group (15-64 years) as much as 74.1% and dominated by men at 58.9%. All patients showed Rifampicin Sensitive results. **Conclusion:** Most tuberculosis patients at X Gamping Hospital in 2023-2024 were of productive age (15-64 years) and were mostly male

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Introduction

Tuberculosis (TB) disease caused by bacteria *Mycobacterium tuberculosis* (MTB) which usually attacks the lungs and can be spread through coughing, sneezing, or spitting (Noviardi, Masaenah, & Ramadhan, 2020); (Alhawaris & Tabri, 2020); (Amukti, Pratami, & Gumelar, 2024). Transmission occurs by inhaling only a small part of these bacteria which can cause cough, fever, night sweats, and weight loss in patients (Ministry of Health of the Republic of Indonesia, 2023). According to *World Health Organization* (WHO) tuberculosis is a serious global health problem with about 9.6 million new cases and 2.5 million deaths each year (Antara et al. 2022); (Wonda & Nope, 2026); (Bastian et al., 2025)

Indonesia ranks second highest in the world after India with an increasing number of cases, namely 724,306 cases reported in 2022 (WHO, Global TB Report 2022; Ministry of Health of the Republic of Indonesia, 2023). The city of Yogyakarta also recorded a high incidence of TB, with an increase of around 6,360 cases of TB throughout 2025, until November 17, 2025 there were 1,161 cases of TB in all health facilities in the city of Yogyakarta (Yogyakarta Health Office, 2025). Rapid and accurate diagnosis is essential in TB control.

Molecular Rapid Tests (TCM) using the GeneXpert MTB/RIF machine is a diagnostic method based on *Nucleic Acid Amplification Test* (NAAT) that can detect the presence of *Mycobacterium tuberculosis* and resistance to rifampicin automatically within approximately two hours (Nabil, Sari, Ernia, & Sitindaon, 2025); (Retno, Puspodewi, & Pangesti, 2025) (Ministry of Health of the Republic of Indonesia, 2015). The WHO recommends the use of GeneXpert as the primary screening tool for patients suspected of having TB due to the speed and accuracy of the results. Studies show that TCM has high sensitivity and specificity, better than the microscopic BTA method, despite the disadvantage of higher operational costs (Zuraida, Latifah, & Atikasari, 2021); (Indrayati, Mustika, & Natrio, 2024); (Ni'matul Murtafi'ah, Fitri Rahmi Fadhilah 2020); (Simarmata & DB, 2020). However, the Lowenstein Jensen culture method remains the gold standard with sensitivity and specificity reaching 100% (Ministry of Health, 2019).

This research is motivated by the high rate of TB at Hospital X in Gamping Regency and the need to describe the results of the GeneXpert TCM examination in TB patients at the hospital. Active TB case data in this hospital reached 35,636 cases with 93% of patients undergoing treatment, while 623 drug-resistant TB patients were recorded in 2021 (Ministry of Health of the Republic of Indonesia, 2023). This study aims to find out the overview of the results of the TCM GeneXpert examination in TB patients at Hospital X in Gamping Regency during the 2023-2024 period.

Method

This study used a cross-sectional *retrospective design* with secondary data collection from the medical records of tuberculosis patients undergoing the GeneXpert Rapid Molecular Test (TCM) examination at X Gamping Hospital in 2023-2024. Samples were selected purposively according to inclusion criteria, namely medical record data for Tuberculosis (TB) patients for the 2023-2024 period, patients who took the GeneXpert Rapid Test (TCM) examination at the medical laboratory of RS X in Gamping Regency, GeneXpert Molecular Rapid Test (TCM) examination data complete with gender and age, data on patients who conducted Molecular Rapid Test (TCM) examinations other than 2023-2024 and exclusion criteria. Data were analyzed descriptively and bivariately using SPSS version 22 to see the distribution of examination results by age and sex. The

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examination procedure uses a GeneXpert machine with sputum sample processing according to laboratory standards. The research has obtained ethical approval from the Research Ethics Committee of X Gamping Hospital with letter number No.255/KEP-PKU/X/2025.

Result and Discussion

1. Results

This study was conducted by taking secondary data on Pulmonary Tuberculosis patients who were examined using the GeneXpert machine at X Hospital in Gamping Regency in 2023-2024.

Table 1
 Distribution of Frequency of TCM Examination Results at X Hospital in Gamping Regency in 2023-2024 Based on Gender and Age.

Patient Data	Quantity (Patient)	Introduce yourself (%)
Gender		
Female	46	41.1%
Male	66	58.9%
Age		
Elderly (>64 years old)	29	25.9%
Productive (15-64 Years)	83	74.1%
Total	112	100%

Based on the results of Table 1, it shows that the distribution of TCM examination frequencies at X Gamping Hospital in 2023-2024 is found that the majority of the total 112 patients are men as many as 66 people (58.9%) and in the productive age category (15-64 years) of 83 people (74.1%). Meanwhile, female patients amounted to 46 people (41.1%) and the elderly group amounted to 29 people (25.9%), so it can be concluded that the patient profile is dominated by men and productive age groups.

Table 2
 Frequency Distribution of TCM Examination Results at X Hospital in Gamping Regency in 2023-2024

Examination Results	Quantity (Patient)	Percentage (%)	Description/difference
Sensitive Rifampisin	112	100%	Bacteria are still resistant to rifampicin drugs.
Rifampicin Resistant	0	0%	Bacteria are already resistant to the drug rifampicin (TB-MDR)
Rifampisin Intermediate	0	0 %	Doubtful results (at sensitivity thresholds)
Invalid	0	0 %	Failed test (damaged sample or tool error)
Negatives	0	0 %	No TB bacteria found in the sample
Total	112	100%	

Based on the results in table 2, Frequency Distribution of TCM Test Results at X Gamping Hospital in 2023-2024, the results of the TCM (Molecular Rapid Test) examination classify the status of bacterial resistance to Rifampicin into three main categories: Sensitive, Resistant, and Intermediate. Based on the data obtained, all patients (100%) are in the category of Rifampicin Sensitive, which means bacteria *Mycobacterium Tuberculosis* in patients still have sensitivity to first-line antibiotics. The absence of Resistant or Intermediate cases showed that no genetic mutations were detected in this

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sample group (such as in the gene *rpoB*) that causes immunity to the drug Rifampicin, so standard treatment protocols are still effective to use.

Table 3

Distribution per year of TCM examination at Hospital X in Gamping Regency in 2023-2024.

Year of Examination	Quantity (Patient)	Percentage (%)
Year 2023	57	50.9%
Year 2024	55	49.1%
Total	112	100%

Based on Table 3, it shows data on the frequency of TCM examinations per year at X Gamping Hospital in 2023-2024. The total sample in this study was 112 patients. From this data, the highest number of examinations occurred in 2023, which was 57 patients (50.9%), while in 2024 there was a slight decrease in the number of examinations to 55 patients (49.1%).

2. Discussion

This study aims to describe the results of tuberculosis (TB) examination using the GeneXpert Molecular Rapid Test (TCM) at X Hospital in Gamping Regency in 2023–2024. In terms of patient characteristics, the findings of this study show that the productive age group (15–64 years) dominates TB cases by 74.1%, while the elderly group (>64 years) accounts for 25.9%. This is in line with research by Sutanto et al. (2022) and Khairunnisa (2021) which states that high cases at productive age are closely related to social mobility and work activities which increase the risk of exposure to sources of infection. From the perspective of TB control, the dominance of cases at productive age has serious implications, both epidemiologically and economically. This age group is the backbone of the labor force, so the high burden of TB in this group can have an impact on decreased productivity, increased work absence, and household economic burden. In addition, the high mobility of the productive age group also has the potential to expand the chain of transmission in the work environment and community, so active screening programs in the workplace and public facilities need to be prioritized.

In terms of gender, male patients dominated with a proportion of 58.9% compared to 41.1% women. This is in accordance with research by Wenty et al. (2025) and Nur'aini et al. (2021) which suggest that men tend to have greater behavioral risk factors, such as smoking habits and exposure to more intense outdoor environments, which can significantly decrease the body's resistance to tuberculosis infection. The dominance of TB cases in men of productive age underscores the need for a gender-sensitive approach to TB control programs, including by reaching out to working male groups through active case finding strategies in the work environment, community health posts, and crowd centers.

The results of the TCM examination in Table 2 showed that all 112 patients (100%) were declared Rifampicin Sensitive, without finding a single case of Rifampicin Resistant or Intermediate. These findings are clinically significant: all patients can immediately begin a standard first-line OAT treatment regimen without requiring therapeutic escalation to the more complex, more toxic, and more expensive second-line OAT. The absence of MDR TB cases in this sample also indicates that in the coverage area of RS X Gamping, primary resistance to rifampicin has not been detected in the 2023–2024 period, which is a favorable condition for local TB control programs. This is in line with the

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research of Rrezarta Bajrami et al. (2018) which revealed that GeneXpert has high accuracy in detecting *Mycobacterium tuberculosis* and rifampicin resistance quickly and accurately. WHO also recommends the GeneXpert TCM method as the standard for TB diagnosis due to its superior speed, sensitivity, and specificity compared to conventional microscopic methods (Mekkaoui et al., 2021).

The distribution of cases by year (Table 3) shows a stable trend, with 57 cases (50.9%) in 2023 and 55 cases (49.1%) in 2024. This very small decrease (difference of 1.8%) cannot be interpreted as a real decrease in TB numbers, but rather reflects the consistency of screening capacity and diagnosis enforcement at X Gamping Hospital. The stability of this number of cases indicates that the burden of TB in the Gamping area and its surroundings is still significant and requires the continuation of surveillance programs and active case discovery

Conclusion

This study shows that the majority of tuberculosis patients examined with the GeneXpert Molecular Rapid Test (TCM) at X Hospital in Gamping Regency for the 2023–2024 period are dominated by the productive age group (15–64 years) at 74.1% and male at 58.9%. This dominance indicates that TB in the Gamping area is still a real threat to socially and economically active segments of the population, so strengthening community-based and workplace screening is an urgent priority in local TB control programs.

In terms of resistance profile, all 112 patients (100%) showed Sensitive Rifampicin results without any cases of resistance or intermediate outcomes, meaning that first-line OAT treatment is still fully effective in this population. These findings also confirm the strategic role of RS X as an important node in the TB service network in Gamping Regency: GeneXpert-based rapid diagnosis capabilities not only enable appropriate and immediate management for patients, but also contribute to breaking the chain of transmission at the community level through early identification and accurate determination of treatment regimens.

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