Knowledge, Attitudes and Practices of Community Pharmacy Personnel in Tuberculosis Detection, Drug Monitoring and Education

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ARTICLE INFORMATION

ABSTRACT

Introduction: Tuberculosis (TB) is an infectious disease that remains a public health problem in Indonesia, including in Lamongan Regency. The role of community pharmacy worker (pharmacists and pharmacy technicians), is crucial in early detection, treatment monitoring, and TB patient education. This study aims to determine the level of knowledge, attitudes, and practices of community pharmacy workers regarding TB management.

Methods: This study used a descriptive design with a cross-sectional approach, conducted from January to May 2025. The sampling technique used simple random sampling, with 75 respondents from pharmacy worker in Lamongan. Data were collected using a KAP questionnaire adapted from previous studies and tested for validity and reliability.

Results: Knowledge research shows that of the total 75 respondents, as many as 72 people (96%) are in the good knowledge category, while only 1 person (1.3%) has sufficient knowledge, and 2 people (2.6%) are included in the poor knowledge category, most respondents have a good level of knowledge about TB. In the results of the attitude study, the level of knowledge is good (54.6%), respondents with a sufficient level of attitude are 29.3%, and 16% are in the poor category. And the results of practice (100%) have a good level of knowledge in the practice of detection, drug monitoring, and education of TB patients. Factors that influence include educational background, work experience, and training related to TB.

Conclusion: While pharmacists' knowledge and practice are high, sustained and continuous training is crucial to maintain performance and reinforce their contribution to TB control.

Keywords: Attitudes, Community pharmacy staff, Knowledge, Practices, Tuberculosis

INTRODUCTION

Tuberculosis (TB) is a disease caused by Mycobacterium tuberculosis. TB primarily affects the lungs and can affect any part of the body. TB is a directly contagious disease; TB germs primarily attack the lungs, but can also affect other organs. The bacteria enter through the respiratory and digestive tracts, as well as open wounds on the skin. This is most commonly caused by inhalation of droplets from an infected person. The bacteria enter and collect in the lungs, where they thrive, especially in people with weakened immune systems, and spread through the blood vessels or lymph nodes. Therefore, TB infection can infect almost any organ in the body, including the lungs, digestive tract, bones, brain, kidneys, lymph nodes, and others. However, the lungs are the most commonly affected organ. (Sari et al., 2022).

In 2022, East Java reportedly ranked second in Indonesia for TB cases after West Java, with 78,799 cases detected in 2022. This represents an increase compared to the 87,048 cases found in 2023. (Dinkes Jatim, 2023). TB can affect anyone, regardless of age or gender. In 2022, 55% of TB cases were male, 33% were female, and 12% were children. (WHO, 2023). Meanwhile, TB cases in Lamongan City show a higher proportion of TB cases in men than in women. Male cases accounted for 56.7% and female cases for 43.3% of the total population. (Dinkes Lamongan, 2022).

The central government's TB program strategy includes increasing access to quality TB services, such as improving patient adherence to treatment and patient and family support, as well as strengthening the health system and TB management. Furthermore, the Find, Treat, and Cure TB (TOSS TB) movement in the community is a form of TB control service. Through the TOSS TB movement, all patients can be found and treated until cured so they can live decent lives, work well and productively, and not become a source of TB transmission in the community. This method is implemented by Community Health Centers (Puskesmas) through regular home visits (knocking on 1000 doors) by health workers, to conduct early detection of health problems, treatment, promotive-preventive efforts, and control. Health risk factors in the family 7. The level of TSR (Treatment Success Rate) is influenced by several factors, including patient compliance, PMO performance, and the availability of OAT. Several studies have suggested a relationship between patient compliance, the role of PMO, and education by pharmacists. (Utukaman et al., 2021).

Community pharmacies have been identified as potential facilities for detecting TB cases and improving TB treatment outcomes. Studies in countries with a high TB burden, including Indonesia, report that most TB patients initially visit pharmacies for first-aid medication. However, inappropriate management of TB patients in community pharmacies has been studied as a cause of delays in diagnosis and treatment. A study in Indonesia supports the overall delay in TB diagnosis and treatment caused by visits to pharmacies for first-aid medication. In another study, we found that when TB patients received inappropriate treatment recommendations from pharmacies, it resulted in delays in

diagnosis and treatment. Inappropriate management of TB patients in pharmacies can be caused by poor TB knowledge, attitudes, and practices among pharmacy personnel. (Kemenkes RI, 2020).

One of the pharmacist's responsibilities as a healthcare professional is to educate patients about medication use. Drug information services can be categorized as active or passive. Active drug information services mean services are provided without waiting for patient inquiries, such as providing booklets/leaflets for patients to take freely. Passive drug information services mean pharmacists respond to patient questions about medications. (Rikomah, 2016). Active drug information services are a commitment of healthcare professionals to improving patients' quality of life. Research in Indonesia has shown that patient satisfaction with drug information services provided at community pharmacies remains low. The majority of patients report that pharmacists lack the ability to provide comprehensive drug information and are unable to maximize the use of brochures and leaflets as information sources. (Harlianti et al.,2016). Selain itu, satu studi Muharni et al., (2015) reported that 63.10% of pharmacy personel tend to distribute drug information services passively.

Pharmaceutical service facilities are the means used to provide pharmaceutical services, including pharmacies. Pharmaceutical services in pharmacies, which were initially focused solely on managing drugs as a commodity, have become comprehensive services aimed at improving patients' quality of life. As a consequence of this shift in orientation, pharmacists are required to improve their knowledge, skills, and behaviors to enable them to interact directly with patients. These interactions include providing information, monitoring drug use to ensure it meets expectations, and maintaining proper documentation (Minister of Health Decree No. 1027/Menkes/SK/IX/2004). The purpose of establishing pharmaceutical service standards in pharmacies is to serve as guidelines for pharmacists' practice in carrying out their profession, to protect the public from unprofessional services, and to protect the profession in carrying out pharmaceutical practice. Pharmaceutical service standards encompass resource management and patient care.

The role of pharmacists in TOSS TB according to (Utukaman et al., 2021), The results of the study showed that the demographic characteristics of respondents at both community health centers did not differ significantly. Significant differences between the two community health centers were found in knowledge, adherence, clinical outcomes based on negative AFB at the end of intensive treatment, and patient satisfaction with PMO. Meanwhile, side effects and patient weight were not significantly different between the two community health centers. This indicates that education and monitoring by pharmacists have an impact on increasing the number of patients who successfully undergo TB treatment. Analysis of significant factors related to treatment success showed that pharmacist intervention significantly influenced patient adherence, patient knowledge, and PMO.

According to (Kausar et al., 2023) Knowledge, Attitude, and Practice are essential in the pharmacy community, as they are related to improved TB treatment

and prevention, and can also improve TB case detection and yield positive outcomes. Several studies have focused on Knowledge, Attitude, and Practice (KAP) related to TB in many countries and found a positive correlation between KAP and improved TB care and prevention. A cross-sectional study conducted (Ramadhany et al., 2020) in Indonesia estimates that adequate knowledge about TB can help in the treatment and prevention of TB. Based on the description above, the researcher was interested in conducting this research due to the lack of similar research. This study aims to examine the knowledge, attitudes, and practices of community pharmacists regarding TB detection, drug monitoring, and education.

METHOD

This study used a Cross-sectional design conducted from December 2024 to May 2025 on pharmacy personel. The population in this study amounted to 160 pharmacy personel consisting of pharmacists and Pharmacy Vocational Personnel (TVF), and obtained a sample of 75 obtained using the Simple Random Sampling method. Ethics approval was obtained from the Ethics Committee of Universitas Muhammadiyah Lamongan granted ethical approval under protocol number 043/EC/KEPK-S1/01/2025, dated June 31, 2025.

Simple Random Sampling is a technique for taking samples of population members randomly, without paying attention to the strata in the population. (Fajar et al., 2021). Simple random sampling is a sampling technique that uses specific criteria. The inclusion criteria were pharmacists practicing in pharmacies in Lamongan Regency during the survey and willing to complete the distributed survey. The exclusion criteria were pharmacists who were unwilling to complete the questionnaire. Data were collected using a KAP questionnaire adapted from a previously validated instrument (PMC10276589). Although pharmacists demonstrated high levels of knowledge and practice, continuous training remains essential to maintain competencies and strengthen their role in tuberculosis control.

Data were analyzed using descriptive statistics and presented as frequencies and percentages to see the knowledge, attitudes and practices of community pharmacy personnel in tuberculosis detection, drug monitoring and education.

RESULTS

This research was conducted in Lamongan Regency, East Java Province. The research location included several pharmaceutical service facilities, such as pharmacies. Lamongan Regency is one of the regions with a sufficient number of health facilities, both in terms of the number of pharmacies and Vocational Pharmacy Personnel (TVF), who are responsible for implementing standardized pharmaceutical services, including measuring the knowledge, attitudes, and practices of community pharmacists in TB detection, drug monitoring, and education. (Dinkes Lamongan, 2022).

In this study, the general characteristics of the respondents included gender, age, highest level of education, employment in a pharmacy, and TB training experience.

Tabel 1. Demographic data of responden

Variable		n	(%)
Knowledge level	Good	72	96%
	Enough	1	1.3%
	Not enough	2	2.6%
	Total	75	100%
Gender	Man	11	14.6%
	Woman	64	85.4%
	Total	75	100%
Age	20-30 th	58	77.4%
	30-40 th	11	14.6%
	>40 th	6	8%
	Total	75	100%
Job in pharmacy	Pharmaceutical vocational staff	47	62.6%
	Pharmacist in charge	21	28%
	Companion pharmacist	7	9.4%
	Total	75	100%
TB training	Not yet/not following	67	89.4%
	< 6 months	6	8%
	6 months-1 year	1	1.3%
	1-2 years	1	1.3%
	Total	75	100%

Table 2. Knowledge, attitude and pharmacy personnel practices toward drug monitoring detection and TB education

Parameter	Knowledge level	n	(%)
Community pharmacist knowledge on drug monitoring, detection and TB education	Good	72	96%
	Enough	1	1.3%
	Not enough	2	2.6%
	Total	75	100%
Community pharmacy staff attitudes towards drug monitoring, detection and TB education	Good	41	54.6%
	Enough	22	29.3%
	Not enough	12	16%
	Total	75	100%
Pharmacy personnel practices in drug monitoring, detection and TB education	Good	75	100%
	Enough	0	0%
	Not enough	0	0%
	Total	75	100%

Table 1. This characteristic analysis serves as a baseline for describing the distribution of community pharmacy personnel who were the subjects of the study in Lamongan Regency. This information is crucial for understanding the demographic profile of the respondents, which can ultimately assist researchers in identifying the dominant group of pharmacy personnel directly involved in pharmaceutical services.

DISCUSSION

Table 1 above shows the gender distribution of the 75 respondents who participated in the study. Based on this data, the majority of respondents were female, with 64 respondents, or 85.4% of the total. Meanwhile, There were only 11 male respondents, which is equivalent to 14.6%.

The dominance of female respondents in Lamongan Regency reflects the fact that the majority of respondents, 64 people or 85.4%, were female, as found in the gender-specific research data. For example, in research conducted by (Anjelina et al., 2022) The dominance of female respondents in Lamongan Regency reflects the fact that the majority of respondents, 64 people or 85.4%, were female, as found in the gender-specific research data. For example, in research conducted by

Research by (Adolph, 2017) in Medan City found that more than 75% of the pharmacists who participated in their research were women. This is also supported by a study (Kaaffah et al., 2023) reported that the proportion of female pharmacists is higher than that of male pharmacists in various regions of

Indonesia, particularly in community service sectors such as pharmacies. The high participation of women in the pharmaceutical sector may be due to the public's perception of this profession as a job suited to women's characteristics, as well as the relatively flexible working hours that meet women's needs in managing domestic and professional roles. Therefore, the gender distribution in this study aligns with the demographic profile of community pharmacists in various regions of Indonesia.

The findings indicate that pharmacy personnel demonstrated good levels of knowledge, positive attitudes, and good practices related to tuberculosis control. However, the alignment between these domains should be interpreted cautiously. Good practice observed in this study may be influenced by individual motivation and awareness rather than being supported by standardized systems or structured programs. Without continuous training and institutional support, there is a potential risk that current good practices may not be sustained consistently over time.

Based on the age distribution of respondents, it can be seen that the majority of community pharmacists were in the 20–30 age group, amounting to 58 people (77.4%). This age group is considered to be in the early productive age group, generally still in the adaptation and career development phase in the workplace. Therefore, they tend to have high work enthusiasm, openness to new learning, and great potential to absorb information and implement knowledge in the field. This presents a strategic opportunity to increase the capacity of pharmacists, particularly in the aspects of detection, drug monitoring, and education

related to TB. With the right coaching and training approach, this age group can play a more active and effective role in mendukung program pengendalian TB di komunitas (Kemenkes RI, 2023).

The predominance of young people in this study may suggest that younger pharmacists have the potential to have better access to information, adapt to the technology used in drug monitoring, and are more open to TB-related training or education. However, on the other hand, older age groups have more work experience and involvement in field practice, so it is important to balance the enthusiasm of the younger generation with the experience of the older generation in strategies to strengthen the role of pharmacists (BPS-Statistics, Indonesia, 2023).

Similar findings were also conveyed by (Padang et al., 2025) In his research on healthcare worker competency, he found that younger age correlates with greater motivation to learn and openness to training. This suggests that age is a critical factor in determining the readiness and effectiveness of pharmacy personel in supporting public health programs, including TB control.

Based on the distribution of types of work of 75 community pharmacy workers, the majority of respondents (47 people or 62.6%) are vocational pharmacy workers, namely graduates of secondary education or diplomas who have technical duties in pharmaceutical services, such as preparation, administration of drugs, and basic information services to patients.

Meanwhile, 21 respondents (28%) were responsible pharmacists, who are legally and ethically responsible for all pharmaceutical activities in the pharmacy.

They play a strategic role in detecting TB cases, ensuring patient adherence to therapy, and providing education regarding treatment and side effects. Only 7 respondents (9.4%) acted as assistant pharmacists, who complement or replace the pharmacy's daily operations but retain their professional authority as pharmacists. This is in line with research results Ningrum et al., (2022). in Mataram City, which shows that as many as 70.25% of active pharmacy personel Vocational workers play a role in handling the COVID-19 pandemic in pharmacies. They are not only responsible for managing medications but also providing health education and information to the public.

This distribution indicates that the role of TB services in the community is still largely carried out by vocational pharmacists. This requires attention because vocational staff have limited expertise in clinical education and therapeutic decision-making, which are the primary domain of pharmacists. Therefore, more active involvement and provision of vocational staff through TB training is crucial, especially in areas such as Lamongan Regency. The increase in TB cases in Lamongan Regency may be caused by several factors. First, high population mobility and dense urbanization in several sub-districts allow for the rapid spread of Mycobacterium tuberculosis. Second, limited access to quality health services in certain areas remains a challenge, resulting in suboptimal early detection of TB. Third, social stigma persists against TB sufferers, preventing individuals from seeking immediate medical attention. Furthermore, although the national TB control program is ongoing, the involvement of

community-level health workers, including pharmacists, still needs to be improved in terms of treatment monitoring and patient education. These factors may contribute to the increase in TB cases in Lamongan in recent years. (Dinkes Jatim, 2023).

To ensure optimal TB detection and monitoring programs, collaboration between pharmacy technicians, responsible pharmacists, and assisting pharmacists must be strengthened to ensure the quality of pharmaceutical services for TB patients at the community level. (Adolph, 2016).

In the distribution of Tuberculosis (TB) training experiences among community pharmacists who participated, the majority of respondents, namely 67 people (89.4%), had never or did not participate in TB training. Only a small proportion had participated in training within a certain period: 6 people (8%) in the last <6 months, and 1 person (1.3%) in the periods of 6 months–1 year and 1–2 years. This distribution indicates a large gap in training and capacity building of community pharmacists, particularly related to TB control programs. Given the important role of pharmacists in education, early detection, and monitoring of TB treatment in the community, this lack of training has the potential to impact their effectiveness in supporting the national TB control program. (Kemenkes RI, 2020).

Previous research has consistently shown that the frequency of TB training among pharmacy staff remains low. In Indonesia, this is confirmed by a multicenter study. (Pradipta et al., 2022) A study involving 844 pharmacists across various regions reported that only about 51% of respondents had recently participated in TB training. Meanwhile, although most had positive attitudes and a good level of knowledge, only 1.3% were actively involved in TB treatment support practices, such as patient detection or education.

This situation can also have direct implications for the knowledge, attitudes, and practices of pharmaceutical professionals regarding TB. Without adequate training, understanding of TB management protocols, drug resistance, drug interactions, and educational approaches to patients can be severely limited. Therefore, ongoing interventions are needed in the form of routine and structured training targeting all levels of pharmaceutical professionals, both pharmacists and vocational pharmacy personnel, to enable them to optimally carry out their clinical and educational roles, particularly in supporting TB elimination in Lamongan Regency. (Yuniyarti et al., 2023).

Based on the research results in Table 2, the level of knowledge of community pharmacists regarding TB detection, drug monitoring, and education in Lamongan Regency shows that the majority of respondents had a good level of knowledge. Of the 75 respondents, 72 (96%) had good knowledge, while only 1 (1.3%) had sufficient knowledge, and 2 (2.6%) had poor knowledge.

This distribution indicates that, in general, community pharmacists have an adequate understanding of the important aspects of TB management. This good knowledge reflects professional awareness and access to health information, both through formal education and daily work practice (Alves et al., 2024).

However, the existence of respondents with insufficient knowledge remains a concern in public health service research.

Limited knowledge among some pharmacy personel can impact the effectiveness of educational communication to patients, the accuracy of early detection, and monitoring of medication adherence.Menurut Launiala, (2019), Limited knowledge in the health sector often hinders changes in attitudes and practices, so training and capacity building are key to the success of health interventions at the community level.

Research conducted by Yasin, (2017) also emphasized that pharmacists' knowledge of TB significantly influences their ability to provide appropriate counseling to patients. The study recommends that routine practice-based training be provided to pharmacy staff involved in community services to ensure their understanding is up-to-date with national guidelines. The fact that the majority of respondents in this study had never attended TB training (89.4%) further reinforces the importance of training in establishing and maintaining a good level of knowledge. This is in line with findings from Silva et al.,(2020) which states that formal training for health workers, including pharmacists, has a positive correlation with increasing knowledge and skills in handling infectious diseases such as TB. The requirement for periodic renewal of professional competency certification encourages pharmacists to engage in continuous learning, which may explain the high level of knowledge observed even among those who had not recently participated in formal TB-specific training.

Therefore, systematic efforts are needed to expand the scope of training and information updates to all community pharmacy staff, so that they can optimally carry out their strategic role in the national TB control program.

Table 2 shows that the majority of pharmacists (54.6%) have a good level of knowledge regarding their role in the TB program. This is a positive indication that more than half of pharmacists understand the importance of patient education, therapy monitoring, and preventing side effects from anti-TB drugs (OAT).

However, 29.3% of respondents still had sufficient knowledge, and 16% were in the poor category. This indicates that nearly half of the respondents lacked optimal knowledge, potentially impacting the quality of pharmaceutical care for TB patients, particularly in the Directly Observed Treatment, Short-course (DOTS) program, which requires consistency and in-depth understanding.

Research conducted by (Rahmania et al., 2024) revealed that the attitudes of pharmacy staff in treating TB patients are still inconsistent. The study found that only about 50% of pharmacy staff demonstrated a positive and proactive attitude in providing education, detecting side effects, and supporting the continuity of TB therapy for patients. This attitude was strongly influenced by work experience and participation in TB program training. In another study, (Elfariani et al., 2022) found that pharmacists with a high level of knowledge tended to show a more supportive and active attitude, such as routinely providing education on the side effects of anti-TB drugs and encouraging patients to complete therapy on schedule.

According to Chusun et,al. (2022), Pharmaceutical workers with a high level of knowledge showed a more proactive attitude in assisting patients and detecting

side effects of OAT. Another study by Maulana et al., (2024) stated that there is a significant relationship between the level of knowledge and attitudes towards the success of TB programs in health facilities.

Based on the data presented in Table 2, all pharmacy staff (100%) had a good level of knowledge in TB detection practices, drug monitoring, and patient education. No respondents had sufficient or insufficient knowledge. This indicates that the pharmacy staff in this study possessed excellent competencies to support their role in the TB control program.

According to WHO and the International Pharmaceutical Federation (FIP), the active involvement of pharmacists in TB patient education, monitoring, and referral is part of the global "End TB" strategy, which prioritizes cross-professional collaboration to improve TB detection and treatment success (WHO & FIP, 2011).

Research by Ullah Khan et al., (2023) showed that clinical pharmacy interventions significantly improved the quality of life of TB patients and detected side effects earlier than the control group. This study reinforces the importance of knowledge as the basis for effective interventions.

Meanwhile research by Thrimawithana et al., (2024) In a scoping review involving 37 studies in various countries, it was stated that pharmacists can improve TB detection through active screening and referral in the community.

Survey by Iskandar et al., (2023) Research in Indonesia also confirms that more than 90% of pharmacists are involved in monitoring TB patient adherence and educating patients as part of a multidisciplinary TB team. This demonstrates that pharmacists with good knowledge are actively implementing standardized practices. Furthermore, Awad et al., (2024) Through a global systematic review, it was concluded that the integration of pharmacists in TB services can increase treatment success, accelerate sputum conversion, and reduce patient default rates.

Thus, the results of the practice data that 100% of pharmacy staff have good knowledge are very consistent with global findings showing that the role of pharmacists is very vital in TB control if accompanied by adequate competence and a strong support system.

CONCLUSION

The generally high levels of knowledge, attitudes, and practices observed among pharmacy personnel indicate a strong foundation for community pharmacy involvement in tuberculosis control. However, to ensure that these competencies are sustained and translated into consistent service delivery, structured implementation strategies are required. Regular and targeted training programs should be instituted to maintain up-to-date knowledge, reinforce practical skills, and align pharmacy-based practices with current TB guidelines. Such training may also serve to standardize service quality across different practice settings and reduce variability related to individual experience. Integrating continuous professional development with routine pharmacy practice may further strengthen the long-term contribution of pharmacy personnel to TB control efforts.

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