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IMPLEMENTATION OF EARLY DETECTION OF LUNG TUBERCULOSIS USING WHO SYSTEMATIC SCREENING GUIDELINES AT THE PUBLIC HEALTH CENTER IN INDONESIA

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Abstract. Background: *Tuberculosis remains a pressing public health concern in Indonesia, ranking second globally after India. Factors contributing to Indonesia's high TB incidence include lengthy treatment, rising HIV/AIDS cases, and multi-drug resistant TB. Effective TB control focuses on targeted screening, avoiding costly mass screening. This study explores early lung TB detection using WHO systematic screening at Tamalate District, Makassar, Indonesia, addressing screening challenges and program management concerns.* ***Method:*** *This descriptive observational study was performed on 153 patients, using primary data from systematic screening following WHO guidelines and a mobile outreach campaign in Tamalate District, Makassar, Indonesia, over 15 days in August 2023. Data were categorized into non-suspected lung TB and suspected lung TB. Suspected cases underwent GeneXpert MTB/RIF testing for TB and rifampicin resistance detection. Patients were divided into four groups – patients with non-suspected TB, suspected TB, diagnosed TB, and drug-resistant TB.* ***Result:*** *Based on screened patient characteristics results, there was a higher distribution of males than females. In contrast, the mean age of our total sample was approximately 48.07 ± 16.37, which tended toward the <55 age group. Regarding the WHO systematic screening method results, we found that 44 had non-suspected lung tuberculosis, 36 had suspected lung tuberculosis but could not expel sputum, 47 were MTB-negative, and 10 were confirmed MTB-positive, and treatment was initiated.* ***Conclusion:*** *This study highlights the effectiveness and efficiency of implementing the WHO systematic screening for active tuberculosis, which was previously not integrated into the Indonesian health system, particularly in the Tamalate District of Makassar, Indonesia.*

Key words: *tuberculosis, screening, public health center, Indonesia*

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INTRODUCTION

Community is a combination of public health, preventive medicine, and social medicine with a broader purpose and scope, namely by organizing all available capabilities or facilities to maintain, protect, and improve the health status of the community [1]. Pulmonary tuberculosis (pulmonary TB) is a contagious infectious disease that is a significant cause of adverse health outcomes and is one of the top 10 leading causes of death worldwide and the leading cause of death from infectious diseases (one rank above HIV/AIDS). Tuberculosis is caused by the bacterium Mycobacterium tuberculosis (MTB), which can be transmitted when a person sick with TB expels the bacteria into the air, for example, by coughing. Most TB bacteria attack the lungs but can also attack other body organs [2]. According to the World Health Organization (WHO), MTB kills about 2 million people annually. The WHO estimates that between 2002 and 2020, about 2 billion people will be infected with the bacteria, of which 5-10% of infections will develop into disease, and 40% of patients will die [3].

Tuberculosis is still a public health problem in Indonesia and has become one of the main problems of the Sustainable Health Development Goals (SDGs) targets. Indonesia has the second-highest number of tuberculosis cases in the world after India. Based on WHO reports (2017 and 2021), in 2016, the number of new TB cases in Indonesia was 391 cases per 100,000 population, then in 2020, it decreased to 301 cases per 100,000 population. The mortality rate of TB cases in 2016 was 38 per 100,000 people. Then, in 2019, it dropped to 34 deaths per 100,000 people. According to the 2013 and 2018 Basic Health Research (Riskesdas) reports, the prevalence of pulmonary tuberculosis in Indonesia in 2013 was 0.4%, then in 2018, it increased to 0.42% [4, 5]. Three factors contribute to the high incidence of TB in Indonesia. The relatively long duration of TB treatment (six to eight months) causes TB patients to stop therapy after feeling healthy, even though the treatment process has not been completed. In addition, the TB problem is exacerbated by the rapid increase in HIV/AIDS infection and the emergence of multidrug resistant TB (MDR, resistant to various drugs). Another problem is that the patient is not sick, but due to decreased immunity, TB disease will appear [5, 6]. The success of the TB control program focuses on program management and the availability of resources to achieve effective and efficient goals.

The WHO has released guidelines that outline the fundamentals of screening for active TB, offer suggestions for prioritizing risk categories, and specify a screening strategy. Mass, indiscriminate screening should be avoided since it is costly, of little value, and prone to producing many false-positive results. One of the fundamental tenets of the recommendations is that TB screening must be appropriately targeted to high-risk groups and customized to each unique circumstance, depending on the epidemiological, social, and health-systems contexts [7]. Based on the Makassar government's statement, the monthly target for TB suspects for each public health center is 100 cases. However, the target was not achieved within 50% by July 2023 due to inadequate tuberculosis screening frequency and methods [8]. Based on the above problems, researchers aimed to determine the implementation of early lung tuberculosis detection using WHO systematic screening guidelines at the Public Health Center in Tamalate District, Makassar, Indonesia.

MATERIALS AND METHODS

This research method is descriptive observational. Primary data were obtained from systematic screening results based on guidelines from the World Health Organization (WHO) with a screening program model based on the mobile outreach screening campaign (Figure 1) conducted in the Public Health Centre in Tamalate District, Makassar, Indonesia, over 15 days in August 2023 [7]. It is hoped that this study will serve as initial research to evaluate the implementation of WHO systematic screening guidelines which is relatively inexpensive and efficient. The research sample was selected using purposive sampling that met inclusion and exclusion criteria. Inclusion criteria in this study included having clinical symptoms sug-

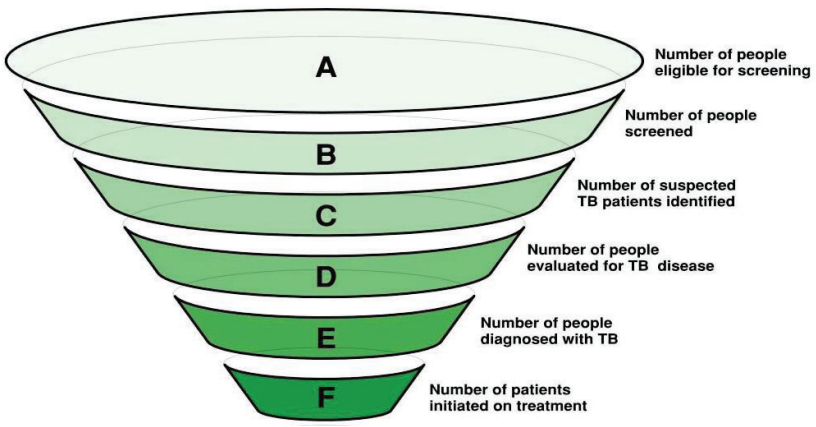

Fig. 1. Systematic screening for active tuberculosis model based on WHO guidelines [7]

gestive of tuberculosis and agreeing to participate. Exclusion criteria included patients diagnosed with tuberculosis before the survey and undergoing treatment, with no history of tuberculosis, and incomplete patient identity sheets.

We divided participants into two groups: patients not suspected of having lung tuberculosis and patients suspected of having tuberculosis. Furthermore, patients with suspected lung tuberculosis were asked to collect morning sputum, which was examined through GeneXpert MTB/RIF (Mycobacterium Tuberculosis/Rifampicin). GeneXpert MTB/RIF is an automated molecular test to detect MTB, which uses a cartridge-based Nucleic Acid Amplification Test (NAAT) to detect TB cases and resistance to the antibiotic rifampicin. After the test, we divided the patients with examined sputum into three groups: MTB-negative, rifampicin-sensitive MTB-positive, and rifampicin-resistant MTB-positive. The final data samples were grouped into four groups: non-suspected lung tuberculosis, suspected lung tuberculosis, diagnosed lung tuberculosis, and drug-resistant lung tuberculosis. The statistical method used univariate analysis to describe general characte-ristics. Ethical clearance was approved by the Ethics Committee of the Faculty of Medicine, Hasanuddin University (No: 38/UN4.6.4.5.31/PP36/2023).

RESULTS

This study was conducted in August 2023 in the Public Health Centre in Tamalate District, Makassar, Indonesia. A total sample of 137 patients who had been screened for lung TB was included in the

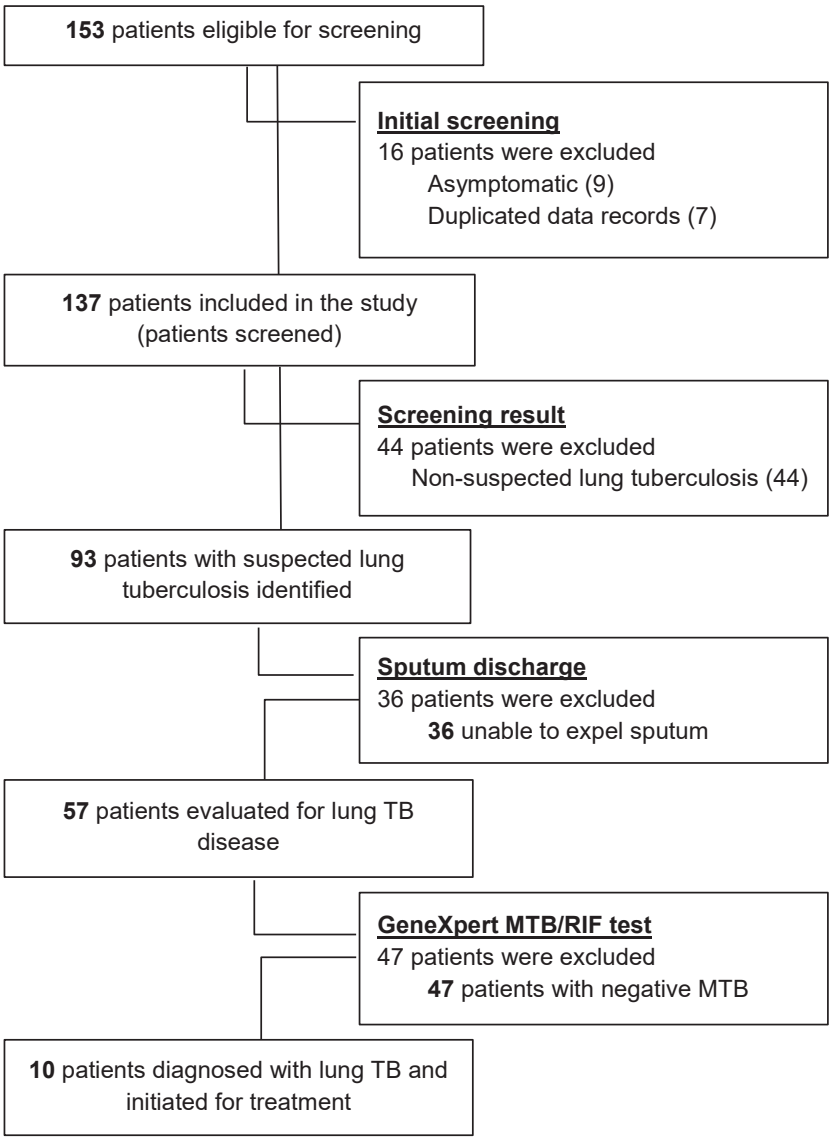

Fig. 2. Implementation of WHO systematic screening for active tuberculosis guidelines in the public health center of Tamalate District, Makassar, Indonesia

Table 1. Patient Characteristics (N = 137)

Patient Characteristics		Non-suspected Lung TB (N = 44)	Suspected Lung TB (N = 83)	Diagnosed Lung TB (N = 5)	Diagnosed drug-resistant Lung TB (N = 5)
Sex, n (%)	Male	32 (31.7)	63 (62.4)	3 (3)	3 (3)
	Female	12 (33.3)	20 (55.6)	2 (5.6)	2 (5.6)
Age (years), n (%)	<55	26 (32.5)	48 (60)	4 (5)	2 (2.5)
	≥55	18 (31.6)	35 (61.4)	1 (1.8)	3 (5.3)
GeneXpert MTB/RIF test, n (%)	No sputum	44 (54.3)	36 (45.7)	0 (0)	0 (0)
	MTB-negative	0 (0)	47 (100)	0 (0)	0 (0)
	Rifampicin-sensitive MTB-positive	0 (0)	0 (0)	5 (100)	0 (0)
	Rifampicin-resistant MTB-positive	0 (0)	0 (0)	0 (0)	5 (100)

MTB = Mycobacterium tuberculosis; RIF = rifampicin; TB = tuberculosis

study. Screening was based on the WHO systematic screening algorithm for active tuberculosis with a screening program model based on the mobile outreach screening campaign. We have created a sample screening flow chart (Fig. 2).

Furthermore, we reported the distribution of the screened patients' characteristics such as gender, age, and GeneXpert MTB/RIF test results (including the group that could not produce sputum), which were divided into four groups: non-suspected lung tuberculosis, suspected lung tuberculosis, diagnosed lung tuberculosis, and drug-resistant lung tuberculosis (Table 1).

DISCUSSION

Several initiatives and strategies are in place to address Tuberculosis (TB) in Indonesia. Indonesia has the second-highest TB burden in the world [9]. The Indonesian government has set a target to reduce TB incidence to 190 per 100,000 adults by 2024 as part of its National Strategic Plan [10]. To achieve this target, the government will implement six approaches, including strengthening health systems at the central, provincial, and district/city levels, improving TB case detection, and increasing access to TB treatment [9]. One strategy to improve TB case detection is to use GeneXpert MTB/RIF. Indonesia's public health center accreditation system also includes TB control standards, particularly for the Directly Observed Treatment Short-course (DOTS) strategy [11]. In addition, the 2021 Mission Tuberculosis Roadmap was developed to support the Indonesian government's efforts to eliminate TB by 2035 [12]. The WHO has supported the Ministry of Health in conducting a Tuberculosis Epidemiological Review by 2022 to eliminate the TB problem in Indonesia [11]. The government's commitment to eliminate TB is supported by the highest level of government, and TB elimination has always been a priority health issue in Indonesia [9]. Thus, one of the main objectives that has been achieved in this study by using WHO systematic screening for active tuberculosis has been proven to be effective and efficient in the early detection of TB [8].

Indonesia has several methods of tuberculosis screening, including symptom-based screening with a sensitivity of only 70%. Additionally, symptom-based screening relies on patients recognizing and reporting their symptoms, which may not always happen due to various reasons, such as lack of awareness, stigma, and fear of discrimination. Other methods include targeted screening for high-risk populations, a simple screening tool for the elderly population, mass screening, and SIKRIBO (Tuberculosis Screening System), a questionnaire designed to be used by healthcare workers. Overall, the weaknesses of TB screening methods in Indonesia include limited sensitivity, availability, feasibility, and cost-effectiveness. These weaknesses must be addressed to ensure the successful implementation of TB screening programs in Indonesia [13-16]. However, the WHO's systematic screening for active tuberculosis has several benefits to overcoming current screening methods' weaknesses in Indonesia, including improving health outcomes, providing public health benefits, being cost-effective, and promoting equity [7].

Our descriptive study found the results of lung tuberculosis detection to be organized and systematic. Previously, the WHO systematic screening method was not integrated into the Indonesian health sys-

tem, including at the public health center in Tamalate District, Makassar, Indonesia. Several studies have implemented the same method; one from the Kitwe district in Zambia found that integrating systematic screening for TB in outpatient departments of urban primary healthcare facilities was successful. The study identified the need for contextual adaptation of the systematic screening for TB program and strengthening the health system to find the missing TB cases [17].

Based on screened patient characteristics results, there was a higher distribution of males than females. It has been reported in previous studies that women are more likely to access advanced health facilities than men, so Indonesian women are more likely to experience delays in receiving a TB diagnosis and less likely to be offered a sputum test for bacteriological confirmation at the initial/primary level of care [18]. This study also supports the hypothesis that women are less likely to present with severe symptoms than men, which may be due to biological differences in TB susceptibility. However, it remains to be explored the mechanisms by which differences in susceptibility to TB are compared by sex [19]. We also found in a study on knowledge, attitudes, and perceptions of TB in Indonesia that more than half of the participants in the study were women (60.9%) [20]. Sex was also equally represented among patients diagnosed with TB in a qualitative study exploring TB treatment programs in Indonesia [21]. Overall, the search results suggest sex differences in service-seeking and access to TB diagnosis in Indonesia. Women may face more barriers in accessing TB diagnosis and treatment, mainly due to limited diagnostic capabilities at the initial/primary health facility. However, gender representation among patients diagnosed with TB is relatively similar.

In addition to gender, our study reported that both the < 55 years and ≥ 55 years age groups were almost equal, and the mean age of our total sample was approximately 48.07 ± 16.37, which tended toward the < 55 years age group. Based on several previous studies, it has been concluded that tuberculosis can affect all age groups in Indonesia. The prevalence of TB in the Indonesian population aged 15 years and over is 759 per 100,000, with a tendency for TB to increase with age. The highest TB prevalence is in older people (55 years and above), with 1,581.7 per 100,000 population. Regarding morbidity and mortality from TB, the 15-49 age group has the highest risk of causing death among all age groups in the Indonesian population [9, 22]. Overall, the results show that TB affects all age groups in Indonesia, with the highest prevalence of TB in older people. Therefore, TB diagnosis and treatment must be done in all age groups to ensure early detection and appropriate treatment.

Implementing systematic screening for active tuberculosis in this study has several limitations due to various factors, such as diagnostic work of TB screening can be low, especially in populations with a low prevalence of TB; limited resources, including trained staff, diagnostic equipment, and laboratory capacity; poor-health seeking behavior with various reasons, including lack of awareness, stigma, and fear of discrimination. Health workers may not have a clear understanding of the screening protocols, which can lead to inconsistent or incorrect implementation of the screening program. Barriers to accessing care, including financial barriers, transportation barriers, and long waiting times are among the various factors making the implementation of the WHO systematic screening method difficult to incorporate into real world practice resulting in low TB screening and testing capacity. Health facilities may need more ability to screen and test for TB, which can result in long waiting times and delays in diagnosis and treatment. In addition, this study is a preliminary study that uses descriptive observational methods and design, so it certainly has a high bias. Therefore, further research is needed with more advanced methods and procedures so that this screening method can be proven successful in detecting TB in the community context quickly and accurately, especially in Indonesia.

CONCLUSION

This study highlights the effectiveness and efficiency of implementing the WHO systematic screening for active tuberculosis, which was previously not integrated into the Indonesian health system, particularly in the Tamalate District of Makassar, Indonesia. The study's findings emphasize the need for improved TB diagnosis and treatment across all age groups, as TB can affect individuals of all ages in Indonesia.

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