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Counseling on Tuberculosis Prevention and Treatment for Students of Pancar Bakti High School, Gunung Pancar, Bogor

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ABSTRACT

Tuberculosis (TB) is an infectious disease that remains a public health problem in Indonesia. According to 2024 data from the Indonesian Ministry of Health, Indonesia ranks second in the world in the number of TB cases, behind only India. Low knowledge of TB prevention and treatment among adolescents is a significant contributing factor to the spread of this disease. This Community Service activity aims to increase students' knowledge and awareness at Pancar Bakti High School, Gunung Pancar, Bogor, regarding TB prevention and treatment. The activity methods included interactive counseling, group discussions, and knowledge evaluation through pre- and post-tests. The activity results showed a significant increase in participants' understanding of TB, with the average post-test score rising by 35% compared to the pre-test.

INTRODUCTION

Tuberculosis (TB) is an infectious disease caused by Mycobacterium tuberculosis, an acid-fast bacillus (AFB) that is aerobic and slow-growing. This germ primarily attacks the lungs, but can also attack other organs such as bones, kidneys, skin, and the central nervous system (Jani et al., 2023; Liu et al., 2011). Transmission occurs through airborne droplets expelled by people with pulmonary TB when coughing, sneezing, or talking, which healthy people around them then inhale (Gopalakrishnan & Salgame, 2016; Jani et al., 2023; Varshney et al., 2022). Mycobacterium tuberculosis has a complex cell wall with a high lipid content, making it resistant to disinfectants and extreme environmental conditions. After entering the respiratory tract, this bacterium is endocytosed by alveolar macrophages, triggering a cellular immune response by activating CD4+ T-helper cells, which, in turn, produce granulomas as a form of body defense.(Khan et al., 2019; Liu et al., 2011; Ruifeng et al., 2023).

This disease remains a significant public health problem worldwide. According to the World Health Organization (WHO, 2024), there are approximately 10.6 million new TB cases worldwide, with a death toll of 1.3 million. Indonesia alone contributes approximately 845,000 cases per year, ranking second only to India in the number of global TB cases. TB remains an international public health problem. According to the World Health Organization (Organization, 2025; Pomandia et al., 2017; Zihad et al., 2023), there are approximately 10.6 million new TB cases worldwide and 1.3 million deaths, making it the second-highest cause of death from an infectious disease after COVID-19. Indonesia has the second-highest number of TB cases worldwide after India, with an estimated 845,000 new cases per year and approximately 150,000 deaths (Gopalakrishnan & Salgame, 2016; Hwanga et al., 2017; Organization, 2020). According to the Indonesian Ministry of Health (2024), the prevalence of TB in Indonesia is increasing due to low early detection, delayed diagnosis, and non-adherence to treatment. Most cases were found in the productive age group (15–45 years), including high school students. This is a concern because the adolescent group is a generation that has the potential to spread or inhibit TB transmission depending on their level of knowledge (Kiziltaş & Babalik, 2023; Mortaz et al., 2015; Soedarsono et al., 2020).

West Java, including Bogor Regency, has one of the highest TB incidence rates in Indonesia, reaching 228 cases per 100,000 population in 2023 (Jani et al., 2023). Socioeconomic factors, population density, and poor sanitation contribute to the high rate of disease transmission in this region. Risk factors for TB transmission in Indonesia are complex, including overcrowding, poor nutrition, inadequate home ventilation, smoking, and delayed diagnosis and treatment. Among adolescents, awareness of the importance of early TB detection and prevention remains low. Lack of awareness of early symptoms, such as coughing for more than two weeks, night sweats, and weight loss, leads to many cases going undetected.

Pancar Bakti High School, located in the Gunung Pancar area of Bogor, is a school with diverse socioeconomic backgrounds. Based on initial observations and interviews with school officials, most students lack a good understanding of TB and how to prevent it. This is further reinforced by the lack of TB-related health education specifically targeting high school youth. Through this Community Service activity, a team from the Faculty of Medicine at the Indonesian Christian University (UKI) took the initiative to conduct an outreach program themed "TB Prevention and Treatment for a Healthy and Caring Generation," aiming to increase awareness, knowledge, and foster positive attitudes toward clean and healthy living among Pancar Bakti High School youth. This activity also aligns with the national program, the TB-Free Indonesia Movement 2030, which targets TB elimination through increased public education, early detection, and complete treatment.

IMPLEMENTATION AND METHODS

Time and Venue of the Activity

The activity was held on February, 2024, in the auditorium of Pancar Bakti High School, Gunung Pancar, Bogor Regency.

Participants

Participants consisted of 60 students from grades 11 and 12 of Pancar Bakti High School, selected by the school based on recommendations from their homeroom teachers.

Activity Stages

1. Preparation:
    a. Coordination with the school to determine the time and location of the activity.
    b. Preparation of outreach materials covering: an introduction to TB, transmission methods, prevention, and treatment management.
    c. Preparation of evaluation tools in the form of pre- and post-tests.
2. Implementation:
    a. Opening remarks and remarks by the school and the community service team.
    b. Presentation of outreach materials by resource persons using visual media (PowerPoint, educational videos, and leaflets).
    c. Interactive discussion between resource persons and participants regarding myths and facts about TB.
    d. Simple simulations on cough etiquette, personal hygiene, and healthy home ventilation.
3. Evaluation:
    a. Completion of a pre-test questionnaire before the outreach and a post-test after the education session.
    b. Assessment of changes in students' knowledge and attitudes toward TB.

Evaluation of Success

Indicators of activity success are measured through:

a. An increase in participants' average knowledge score of at least 25%.
b. Active participation by participants in the discussion and question-and-answer sessions.
c. Positive feedback from participants and accompanying teachers.

RESULTS AND DISCUSSION

The "Prevention and Management of Tuberculosis for Students of Pancar Bakti High School, Gunung Pancar, Bogor" outreach program was held in February 2024 at the school hall, attended by 60 students in grades 11 and 12.

The program lasted three hours and was divided into three main sessions:

1. Session I: Pre-test and Introduction to TB
   Participants completed a pre-test containing 10 questions on basic knowledge of TB (causes, symptoms, transmission, and prevention). Initial results indicated that students' understanding was still low, especially regarding transmission and treatment.
2. Session II: Interactive Outreach and Discussion
   The outreach program was conducted by a team of lecturers and students from the Faculty of Medicine, Universitas Kristen Indonesia (UKI), using interactive PowerPoint presentations, short educational videos, and leaflets. Participants were highly enthusiastic, as evidenced by the numerous questions they asked regarding the BCG vaccine, TB treatment, and stigma against TB sufferers.
3. Session III: Post-test and Activity Evaluation
   Following the outreach, participants completed the same post-test questionnaire to assess their knowledge. The team also conducted qualitative evaluations through participant reflection and feedback sessions.

Quantitative Results

Table 1. Comparison of Pre-test and Post-test Scores for TB Knowledge (n = 60)

No	Knowledge Aspect	Percentage Correct Pre-test (%)	Percentage Correct Post-test (%)	Improvement (%)
1	Understanding the causes of TB (Mycobacterium tuberculosis)	65	95	+30
2	How TB is transmitted (airborne when coughing/sneezing)	58	90	+32
3	Primary symptoms of TB (coughing for more than 2 weeks, night sweats, weight loss	50	88	+38

4	TB prevention efforts (ventilation, cough etiquette, balanced nutrition)	55	92	+37
5	The importance of BCG vaccination	48	85	+37
6	Duration of TB treatment (6–8 months)	42	87	+45
7	Impact of incomplete treatment (drug resistance)	40	82	+42
8	Not transmitted through food or casual contact	52	88	+36
9	Stigma against TB sufferers must be avoided	63	93	+30
10	The role of adolescents in preventing TB in the community	55	90	+35
Total average		**53,0%**	**89,0%**	**+36%**

The table above shows that the average level of knowledge among participants increased from 53% to 89% after the outreach activity, representing a 36% increase. The aspect with the highest improvement was understanding of the duration of TB treatment and the risk of drug resistance, indicating that the outreach was effective in clarifying the common misconception that TB treatment only lasts a few weeks.

Furthermore, the qualitative evaluation results showed:

a. 95% of participants found the activity very useful and easy to understand.
b. 88% of participants stated that they would share this information with family or friends.
c. The school requested that similar activities be held periodically on other infectious disease topics.

Figure 1. Documentation of Extension Activities

The results of the activity showed that interactive counseling was an effective strategy for improving high school students' knowledge about TB prevention and treatment. The 36% increase in average scores indicated that the educational materials and communication methods used successfully enhanced fundamental understanding of TB.

Effectiveness of Interactive Counseling Methods

Interactive counseling methods, combining visual media and group discussions, encouraged active participant participation. A participatory approach increased information retention by up to 80% compared to conventional lecture methods. This aligns with the findings of this activity, which showed that student enthusiasm was reflected in the numerous questions and active participation during the cough etiquette simulation.

Improving Adolescent Health Literacy

Adolescents are a strategic group in health promotion efforts. Their knowledge about TB can influence behavior patterns at home and in the school environment (Chusniah Rachmawati, 2019) demonstrated that school-based educational interventions can reduce stigma and improve behaviors to prevent infectious diseases. During this activity, students expressed their willingness to become "school health ambassadors," a crucial step for the sustainability of TB education.

Clarifying Common Misconceptions

Before the activity, many students believed that TB was transmitted through food or was incurable. After the education, the majority of participants understood that TB is transmitted through airborne droplets and can be cured with regular treatment for at least six months. This type of education is important because the Indonesian Ministry of Health (2024) reported that poor medication adherence and low understanding are the main causes of drug-resistant TB (DR-TB) cases in Indonesia.

Social Impact and Program Sustainability

This activity not only increased knowledge but also fostered empathy for TB patients. Reducing social stigma is a crucial step in strengthening early detection efforts and treatment continuity. The WHO (2024) emphasized that social support and a stigma-free environment are crucial factors in the success of TB elimination by 2030. The school expressed its commitment to continuing the health education program by establishing a Peer Health Educator group (Healthy Youth Cadres) who will act as an extension of health workers in disseminating information.

CONCLUSIONS AND RECOMMENDATIONS

A TB prevention and management outreach program at Pancar Bakti High School in Gunung Pancar, Bogor, successfully increased students' knowledge and awareness of the importance of early TB detection and prevention. The average knowledge score increased by 35% after the event. Through this activity, it is hoped that students will become healthy lifestyle pioneers and contribute to efforts to prevent TB transmission in their communities. In the future, similar activities can be expanded to include training for adolescent health cadres and regular health checks at schools.

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REFERENCES

Chusniah Rachmawati, W. (2019). Promosi kesehatan dan ilmu perilaku.

Gopalakrishnan, A., & Salgame, P. (2016). Toll-like receptor 2 in host defense against Mycobacterium tuberculosis: to be or not to be—that is the question. Current Opinion in Immunology, 42, 76–82. https://www.sciencedirect.com/science/article/pii/S095279151630059.

Hwanga, E.-H., Kim, T.-H., Park, J.-Y., Hong, J. J., Kim, D.-H., Ha, S.-J., Yang, S.-J., Shin, S. J., & Park, J.-H. (2017). TLR2 contributes to trigger immune response of pleural mesothelial cells against Mycobacterium bovis BCG and M. tuberculosis infection. Cytokine, 95, 80–87. https://www.sciencedirect.com/science/article/pii/S104346661730057.

Jani, C., Solomon, S. L., Peters, J. M., Pringle, S. C., Hinman, A. E., Boucau, J., Bryson, B. D., & Barczak, A. K. (2023). TLR2 is non-redundant in the population and subpopulation responses to Mycobacterium tuberculosis in macrophages and in vivo. MSystems, e00052-23. https://doi.org/10.1128/msystems.00052-23.

Khan, A., Bakhru, P., Saikolappan, S., Das, K., Soudani, E., Singh, C. R., Estrella, J. L., Zhang, D., Pasare, C., & Ma, Y. (2019). An autophagy-inducing and TLR-2 activating BCG vaccine induces a robust protection against tuberculosis in mice. Npj Vaccines, 4(1), 34. https://www.nature.com/articles/s41541-019-0122-8.

Kiziltaş, Ş., & Babalik, A. (2023). Tuberculosis: An Overview. In C. Cingi, A. Yorgancıoğlu, N. Bayar Muluk, & A. A. Cruz (Eds.), Airway Diseases (pp. 635–659). Springer International Publishing. https://link.springer.com/10.1007/978-3-031-22483-6_40-1.

Liu, Y., Simmons, D., Li, X., Abbott, D., Boom, W., & Harding, C. (2011). Mycobacterium tuberculosis and TLR2 agonists inhibit induction of type I IFN by TLR7/9 (116.20). The Journal of Immunology, 186(1_Supplement), 116–120.

Mortaz, E., Adcock, I. M., Tabarsi, P., Masjedi, M. R., Mansouri, D., Velayati, A. A., Casanova, J.-L., & Barnes, P. J. (2015). Interaction of Pattern Recognition Receptors with Mycobacterium Tuberculosis. Journal of Clinical Immunology, 35(1), 1–10. https://doi.org/10.1007/s10875-014-0103-7.

Organization, W. H. (2020). World Health Organization Global Tuberculosis Report 2020. World Health Organization, 232.

Organization, W. H. (2025). WHO consolidated guidelines on tuberculosis. Module 3: diagnosis. World Health Organization.

Pomandia, N. M., Waworuntu, O. A., & Homenta, H. (2017). Hasil Diagnostik Mycobacterium Tuberculosis pada Pasien Batuk 2 Minggu dengan Pewarnaan Ziehl Neelsen di Poliklinik Interna RSU Pancaran Kasih Manado. EBiomedik, 5(2), 372660.

Ruifeng, C., Xuan, W., Zilin, L. I., Yumei, D. A. I., Wenya, D. U., & Lixian, W. U. (2023). Human Toll-like receptor 2 genetic polymorphisms with tuberculosis susceptibility: A systematic review and meta-analysis.

Soedarsono, S., Amin, M., Tokunaga, K., Yuliwulandari, R., Dewi, D. N. S. S., & Mertaniasih, N. M. (2020). Association of disease severity with toll-like receptor polymorphisms in multidrug-resistant tuberculosis patients. The International Journal of Mycobacteriology, 9(4), 380–390.

Varshney, D., Singh, S., Sinha, E., Mohanty, K. K., Kumar, S., Barik, S. K., Patil, S. A., & Katara, P. (2022). Systematic review and meta-analysis of human Toll-like receptors genetic polymorphisms for susceptibility to tuberculosis infection. Cytokine, 152, 155791.

Zihad, S. M. N. K., Sifat, N., Islam, M. A., Monjur-Al-Hossain, A. S. M., Sikdar, K. M. Y. K., Sarker, M. M. R., Shilpi, J. A., & Uddin, S. J. (2023). Role of pattern recognition receptors in sensing Mycobacterium tuberculosis. Heliyon, 9(10). https://www.cell.com/heliyon/fulltext/S2405-8440(23)07844-1.