Case Report

PACNJ

The Need for a Healthy Lifestyle in Patients with Multi Drug Resistant Pulmonary TB in Medical Intensive Care Unit: A Case Report

Nisa Cahya Soleha[1], Anastasia Anna, Etika Emaliyawati

[1]Nursing Professional Program, Faculty of Nursing, Universitas Padjadjaran, Indonesia
[2]Departement Emergency and Critical Care, Faculty of Nursing, Universitas Padjadjaran, Indonesia

ARTICLE INFO

Article history:
Received 04-03-2025
Revised 14-03-2025
Accepted 07-04-2025

Keyword:
Healthy Lifestyle, Tuberculosis, Tuberculosis Multi Drug Resistant.

Other information:
Email of Author:
nisa20006@mail.unpad.ac.id

Corresponding Author:
Anastasia Anna

Website:
https://jurnal.unpad.ac.id/ pacnj/

E-ISSN: 2715-6060

ABSTRACT

Pulmonary tuberculosis is an infectious disease caused by Mycobacterium tuberculosis. A healthy lifestyle, including adherence to Anti-Tuberculosis Drugs, quitting smoking, a balanced diet, and regular physical activity, is essential for eradicating the bacteria. This study used a case report method focusing on a 55-year-old male patient with MDR-TB and type 2 diabetes mellitus who was admitted to the Medical Intensive Care Unit. The patient presented with complaints of productive cough, fever, and fatigue. His condition worsened until death, with a history of unhealthy lifestyle habits such as smoking, poor diet, lack of physical activity, and non-adherence to Anti-Tuberculosis Drugs. The management of Multi Drug Resistant Tuberculosis requires integration between pharmacological therapy and healthy lifestyle habits. Family education and lifestyle interventions are crucial to improve medication adherence, treatment success, and the recovery process in patients with Multi Drug Resistant Tuberculosis. Adopting a healthy lifestyle can strengthen the immune system, prevent disease progression, and support the recovery of patients with Multi Drug Resistant Tuberculosis and Type 2 Diabetes Mellitus.

Introduction

Pulmonary tuberculosis is an infectious disease caused by *Mycobacterium tuberculosis*, which can lead to serious complications and death. It typically spreads in areas with poor air quality. According to (WHO, 2023) TB is the second leading cause of death globally, responsible for about 1.3 million deaths. Around 87% of TB cases occur in 30 countries, with Indonesia contributing 10% of global cases. Based on the Global TB Report 2023, Indonesia ranks second worldwide with 1,060,000 cases and 134,000 deaths. In West Java alone, 233,334 TB cases were reported, or about 22% of the national total (Dinas Kesehatan, 2023). Multi Drug Resistant Tuberculosis (MDR-TB) presents a major challenge in TB control. In Indonesia, about 6,800 cases have been recorded, making up 2% of new TB cases and 12% of retreatment cases (WHO, 2023) Unhealthy lifestyles—such as poor medication adherence, smoking, alcohol use, poor diet, and inactivity—contribute to its development.

MDR-TB treatment includes a combination regimen like BPaLM (Bedaquiline, Pretomanid, Linezolid, Moxifloxacin), which is effective but may cause serious side effects. These include neurotoxicity (e.g., psychosis, neuropathy), ototoxicity (hearing loss), hepatotoxicity (liver damage), and cardiac disorders (QT prolongation) (Ur Rehman et al., 2024). Research also shows that uncontrolled drug interactions and systemic infections can worsen neurological conditions and reduce consciousness (Ur Rehman et al., 2024).

Unhealthy habits can lead to treatment failure and increase the risk of MDR-TB. (Riza, 2017) found a link between smoking and failure of TB treatment, while (Ibrahim, 2019) showed long-term smoking weakens immune defenses, aiding infection spread. On the other hand, a healthy lifestyle improves patient outcomes. (Park et al., 2022) found that quitting smoking and adopting healthy habits lowers the risk of MDR-TB and enhances quality of life.

The patient in this case report was in the fifth month of BPaLM treatment but still tested positive for TB and had lung damage. His lifestyle included poor medication adherence, smoking, and poor nutrition, likely contributing to treatment failure. This highlights the crucial role of a healthy lifestyle in managing MDR-TB. This study aims to describe how healthy living supports the healing process in MDR-TB patients.

Method

This study used a case report method focusing on the observation and explanation of a specific case. The case was selected based on the uniqueness of the patient, who was diagnosed with pulmonary MDR-TB. The patient adopted an unhealthy lifestyle after learning of the MDR-TB diagnosis. The case presented was encountered in one of the referral hospitals in West Java Province. The study was conducted over a period of three days, involving data collection through observation of interventions and responses, interviews with the medical team and the patient's family, as well as secondary data obtained from hospital documentation and supporting examination results. The data collection and case report compilation followed legal and ethical standards, including maintaining the confidentiality of the patient's identity and data, avoiding coercion of the patient or family, and obtaining informed consent from the family for data collection and publication, the family agreed to have the case published. The patient underwent sputum examination for 26 days.

Result

The patient was a 55-year-old male farmer diagnosed with pulmonary MDR-TB and type 2 Diabetes Mellitus (DM). He complained of shortness of breath, productive cough, fever, and fatigue. He was brought to the hospital and admitted to the Medical Intensive Care Unit

(MICU) in a state of decreased consciousness. He was placed on a ventilator in Assisted Mandatory Ventilation (AMV) mode with Peak 52%, PEEP 7, FiO2 100%, and an endotracheal tube (ETT) inserted at a depth of 21 cm and a diameter of 7.5 cm due to Acute Respiratory Failure Type II.

Further examinations revealed that the patient was diagnosed with Community Acquired Pneumonia (CAP) with Sepsis and Multiple Organ Dysfunction Syndrome (MODS). He was also diagnosed with Chronic Airway Obstruction caused by the spread of Mycobacterium tuberculosis in his lungs, as evidenced by a chest X-ray showing pulmonary TB with moderate lesions and cavitation, along with cardiomegaly. Laboratory tests showed an elevated PCO_2 of 120.6 mmHg, a decreased PO_2 of 75.2 mmHg, SGOT level of 930 U/L, and SGPT level of 110 U/L.

Vital signs monitoring over three days showed: systolic blood pressure ranging from 96–113 mmHg, diastolic pressure 62–68 mmHg, mean arterial pressure (MAP) 86–96 mmHg, respiratory rate 18–27 breaths/min, pulse rate 76–89 bpm, oxygen saturation (SpO_2) 90–100%, and body temperature ranging from 37.8°C to 38.8°C. Additional findings included rhonchi breath sounds and the presence of pulmonary secretions.

Laboratory tests showed that the MTB (Mycobacterium tuberculosis) test remained positive, indicating ongoing active TB infection. A nasogastric tube (NGT) was inserted and

revealed black-colored gastric fluid, indicating hematemesis, which required the patient to be kept fasting. Fasting blood glucose (FBG) levels ranged from 512 to 228 mg/dL. Procalcitonin levels were also elevated at 2.28 ng/mL, indicating a high risk of severe sepsis. Chest X-ray results continued to show moderate lesions with cavitation and cardiomegaly, with no signs of improvement.

The patient received inhalation therapy every 4 hours, suctioning every 2 hours, and insulin drip to reduce blood glucose levels. Although blood glucose levels showed a decrease, they remained within the high range. Inhalation and suctioning therapies did not produce significant improvement, as Mycobacterium tuberculosis persisted in the patient's body. This was confirmed by laboratory results and chest X-rays indicating the ongoing presence of TB bacteria, which further impaired the respiratory system.

During hospitalization, the patient did not receive enteral nutrition or the BPaLM regimen. As a result, the patient's condition progressively worsened, eventually leading to death.

According to family statements, although the patient was in the fifth month of MDR-TB treatment, he never maintained a healthy diet or eating patterns, never exercised regularly, frequently drank coffee, and smoked 1–2 packs of cigarettes per day. When assessed about their knowledge of pulmonary TB, the family said the patient underwent treatment for six months and continued treatment because he had not recovered. Regarding medication adherence, the family did not directly monitor the patient but only asked whether he had taken his Anti-Tuberculosis Drugs. Often, the patient forgot to take his medication, missing several doses.

Discussion

In general, this case aims to illustrate the importance of maintaining a healthy lifestyle in supporting the recovery process of MDR-TB patients. In this case, the patient with MDR-TB had been undergoing BPaLM treatment for five months, yet the TB bacteria remained positive. This outcome contradicts the expected result of the BPaLM regimen, which should show a

negative result by the fifth month. Further assessment revealed that the patient was non-adherent to TB medication, continued smoking, and did not maintain a balanced, nutritious diet.

A healthy lifestyle plays a crucial role in the recovery process of patients with Multi Drug Resistant Tuberculosis (MDR-TB), especially when associated with comorbid conditions such as type 2 Diabetes Mellitus (DM). In MDR-TB patients, the condition becomes more complex when accompanied by type 2 diabetes. Type 2 DM is a metabolic disease characterized by elevated blood glucose levels due to insulin resistance, which results in a weakened immune system and facilitates the onset of MDR-TB. Therefore, the implementation of a healthy lifestyle is essential to prevent worsening of the condition in MDR-TB patients.

A healthy lifestyle not only contributes to faster recovery and prevents the progression of TB infection, but also helps maintain the patient's quality of life during and after treatment. This is highly relevant, as TB is an infectious disease caused by Mycobacterium tuberculosis that attacks the lungs and can worsen due to unhealthy habits such as non-adherence to anti-TB medication (ATDs), smoking, poor diet, and lack of physical activity (Bozlar & Arslanoğlu, 2016). This is supported by research by (Akbari, 2024) which states that adopting a healthy lifestyle can improve the quality of life in MDR-TB patients. Such lifestyles include engaging in regular physical activity and consuming a balanced diet to boost immunity and support the recovery process from MDR-TB.

Adherence to ATDs is one of the most important aspects of TB treatment. Patients who do not consistently take ATDs are at a much higher risk of relapse or worsening of their condition. In this case, the patient was a 55-year-old man in his productive age, which required him to remain physically active. He worked as a farmer with irregular working hours, often causing him to miss scheduled doses of ATDs. Anti-Tuberculosis drugs can cause several side effects, such as nausea, fatigue, vomiting, digestive disorders (gastric discomfort, stomach pain, constipation), joint pain, dizziness, itching, drowsiness, and tingling sensations. Nausea was the second most commonly reported side effect, experienced by 72.73% of patients and typically occurring immediately after taking the medication. Rifampicin and isoniazid are suspected to be the primary causes of this symptom. Other side effects experienced included fatigue (54.54%), vomiting and digestive disorders (36.36%), joint pain and dizziness (27.27%), and itching, drowsiness, and tingling (9.09%). Despite these adverse effects, non-adherence and irregular consumption of ATDs can cause TB to progress into MDR-TB, necessitating more complex treatment. Therefore, continued use of ATDs is essential. This finding aligns with research by (Yunita, 2020) which found a strong correlation between non-adherence to ATDs and TB relapse. Patients who failed to take their medication regularly had a 50% higher risk of recurrence compared to those who followed their medication regimen consistently. Furthermore, a study by (Ika Febianti et al., 2019) indicated that adherence to ATDs significantly affects the quality of life in TB patients, as consistent and properly dosed intake enhances treatment effectiveness and prevents relapse.

The patient was known to have smoked since a young age, consuming 1–2 packs per day regardless of his health status or TB condition. This habit contributed to his declining health and led to hospitalization in the MICU. The patient experienced several respiratory complications that progressed into Acute Respiratory Failure Type II, marked by moderate lung lesions that required ventilator support. According to (Bai et al., 2017), smoking can alter immune system responses, particularly those involving macrophages and leukocytes, contributing to worsening conditions in TB patients. The nicotine in cigarettes impairs the ability of macrophages to kill Mycobacterium tuberculosis (MTB). It inhibits the formation of autophagosomes in MTB-infected macrophages, increases intracellular bacterial load, and induces

regulatory T-cells to produce transforming growth factor-β (TGF-β), which suppresses immune responses to MTB. Chest X-ray results also showed moderate lung lesions. According to (Ernawati et al., 2017) such lesions are closely associated with TB recovery and are strongly influenced by smoking habits.

During hospitalization, the patient was not given enteral nutrition or BPaLM (Bedaquiline, Pretomanid, Linezolid, Moxifloxacin) therapy due to hematemesis, as indicated by black fluid aspirated from the nasogastric tube (NGT), requiring the patient to be fasted. Nutritionally, the patient had not met normal dietary standards, as indicated by a Body Mass Index (BMI) of 18.4 (underweight). This condition weakened the immune system and increased susceptibility to TB infection. This is in line with research by (Yuniar & Lestari, 2017), which found that nutritional status is a key factor influencing TB progression. Good nutritional status plays a major role in defending the body against infection. Malnutrition weakens the immune system and diminishes the body's ability to fight infection. Another study by (Supriyono et al., 2013)supports this, stating that individuals with poor nutritional status are 7.583 times more likely to develop pulmonary tuberculosis than those with good nutrition. Additionally, discontinuation of BPaLM therapy led to worsening TB infection, as indicated by elevated procalcitonin levels (2.28 ng/mL). This further exacerbated the patient's condition, ultimately leading to death due to undernutrition and halted TB treatment.

The patient had a 15-year history of type 2 Diabetes Mellitus. This condition increases the risk of TB infection. Research by (Puspita et al., 2023) shows that type 2 DM is a significant risk factor for pulmonary TB, as high blood glucose levels impair immune function, making the body more susceptible to TB infection. Another study by (Batubara & Lukito, 2024) found that type 2 DM can trigger chronic inflammation that damages lung tissue, increasing vulnerability to TB. Diabetes is a chronic inflammatory condition marked by metabolic disturbances and blood vessel damage, which negatively affects the immune response to pathogens. This condition also increases the production of adhesion molecules involved in tissue inflammation, heightening the risk of infection. When both DM and MDR-TB coexist, TB treatment effectiveness decreases, and the risk of complications increases due to the patient's weakened immune response (Puspita et al., 2023)

Based on the discussion above, it can be concluded that the prevention and treatment of tuberculosis (TB) should not rely solely on medication or pharmacological approaches. Non-pharmacological interventions, particularly the implementation of a healthy lifestyle, are also essential to prevent the worsening of TB conditions. This is consistent with a study by (Mulyanto, 2015), which found that adopting a healthy lifestyle plays an important role in preventing TB progression. Recommended lifestyle modifications include adherence to ATD therapy, avoiding smoking, consuming nutritious foods to strengthen the immune system, and engaging in regular physical activity. By maintaining a healthy lifestyle, TB patients can avoid disease deterioration into MDR-TB and prevent other complications associated with unhealthy behaviors.

Conclusions

A healthy lifestyle plays an important role in the recovery process of MDR-TB patients, especially those with comorbidities such as type 2 diabetes mellitus. The results of this study indicate that MDR-TB patients who do not maintain a healthy lifestyle—such as non-adherence to medication, smoking habits, an unbalanced diet, and lack of physical activity—may experience worsening of their condition, reduced treatment effectiveness, and an increased risk of complications. Implementing a healthy lifestyle, including adherence to anti-tuberculosis medication, quitting smoking, and consuming nutritious food, can strengthen the

immune system, prevent disease progression, and support the recovery process of MDR-TB.

References

Akbari, D. (n.d.). *Factors that affect the quality of life of mdr tb patients in the mdr tb poly rspi sulianti saroso.*

Bai, X., Stitzel, J. A., Bai, A., Zambrano, C. A., Phillips, M., Marrack, P., & Chan, E. D. (2017). Nicotine impairs macrophage control of mycobacterium tuberculosis. *American Journal of Respiratory Cell and Molecular Biology*, *57*(3), 324–333. https://doi.org/10.1165/rcmb.2016-0270OC

Batubara, F. A., & Lukito, A. (2024). Relationship Of Type II Diabetes Mellitus With The Risk Of Enhancement The Incidence Of Pulmonary Tuberculosis At Haji General Hospital Medan In 2022. *Ibnu SIna: Jurnal Kedokteran Dan Kesehatan Faklutas Kedokteran Universitas Islam Sumatera Utara*, *23*(2), 178–185.

Bozlar, V., & Arslanoğlu, C. (2016). Healthy Life Style Behaviors of University Students of School of Physical Education and Sports in Terms of Body Mass Index and Other Variables. *Universal Journal of Educational Research*, *4*(5), 1189–1195. https://doi.org/10.13189/ujer.2016.040532

Dinas Kesehatan (2023). Laporan Program Penanggulangan Tuberkulosis Tahun 2022. *Dinas Kesehatan*, 1–139. https://tbindonesia.or.id/pustaka_tbc/laporan-tahunan-program-tbc-2021/

Ernawati, K., Susila Duarsa, A. B., Wulansari, R., & Zamzami, L. (2017). Konsep Asuhan Keperawatan Pada Pasien Dengan Diabetes Mellitus. *Jurnal Kedokteran Yarsi*, *25*(1), 33–040.

Ibrahim, V. (2019). Cigarettes and Sputum Conversion Events in Tuberculosis Patients. *Jiksh*, *10*(2), 226–232. https://doi.org/10.35816/jiskh.v10i2.156

Ika Febianti, B., Nurina, L., & Lada, C. O. (2019). Status Gizi, Kadar Hemoglobin, dan Kualitas Hidup Penderita Tuberculosis Paru Sebelum dan Sesudah Terapi Obat Anti Tuberculosis Kategori 1 di Kota Kupang. *Cendana Medical Journal*, *18*(3), 581–585. https://ejurnal.undana.ac.id/index.php/CMJ/article/view/2669/1911

Mulyanto, H. (2014). Hubungan lima indikator perilaku hidup bersih dan sehat dengan tuberkulosis. *Jurnal Berkala Epidemiologi*, *2*(3), 355–367. https://e-journal.unair.ac.id/index.php/JBE/article/download/1302/1061

Park, J., Yoon, J. H., Ki, H. K., Han, K., & Kim, H. (2022). Lifestyle changes and risk of tuberculosis in patients with type 2 diabetes mellitus: A nationwide cohort study. *Frontiers in Endocrinology*, *13*(October), 1–10. https://doi.org/10.3389/fendo.2022.1009493

Puspita, R., Suliati, S., & Mutiarawati, D. T. (2023). The Relationship Between Blood Glucose Levels To The Results Mycobacterium Tuberculosis Examination In Tuberculosis Patients. *Jurnal Analis Medika Biosains (JAMBS)*, *10*(2), 112. https://doi.org/10.32807/jambs.v10i2.330

Riza, L. L. (2017). Hubungan Perilaku Merokok Dengan Kejadian Gagal Konversi Pasien Tuberkulosis Paru Di Balai Kesehatan Paru Masyarakat (BKPM) Wilayah Semarang

Supriyono, Baequny, A., Hidayati, S., Hartono, M., & Harnany, A. S. (2013). Pengaruh Perilaku dan Status Gizi Terhadap Kejadian TB Paru di Kota Pekalongan. *Pena Medika Jurnal Kesehatan*, *4*(1), 8.

Ur Rehman, O., Fatima, E., Ali, A., Akram, U., Nashwan, A., & Yunus, F. (2024). Efficacy and safety of bedaquiline containing regimens in patients of drug-resistant tuberculosis: An updated systematic review and meta-analysis. *Journal of Clinical Tuberculosis and Other Mycobacterial Diseases*, *34*(December 2023), 100405. https://doi.org/10.1016/j.jctube.2023.100405

WHO. Global Tuberculosis Report 2023. World Health Organization. 2023.

Yuniar, I., & Lestari, S. D. (2017). Hubungan Statys Gizi Dan Pendapatan Terhadap Kejadian Tuberkulosis Paru Berdasarkan data Dinas Kesehatan Provinsi Kebumen pada tahun 2015 adalah status gizi . Status gizi adalah salah status sosial ekonomi . Pendapatan per salah satu faktor yang berhubung. *Jurnal Perawat Indonesia*, *1*(1), 18–25.

Yunita, E., Azzahri, L, M., & Afrinis, N. (2020). Motivasi Keluarga Dengan Kekambuhan Penderita Tb. *Jurnal Kesehatan*, *1*, 14–23.