Original Research Article

Impact of Education on Non-Compliance and MDR TB Risk: Specialized Hospital Study

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Abstract

Background: Multidrug-resistant tuberculosis (MDR-TB) poses a significant global health threat, with treatment challenges linked to patient non-compliance. Education has been proposed as a potential strategy to improve adherence and reduce the risk of MDR-TB. This study aims to assess the impact of education on non-compliance and MDR-TB risk among patients receiving treatment at a specialized hospital. ***Objective:*** The primary objective of this retrospective cross-sectional study was to determine whether education provided to MDR-TB patients could reduce non-compliance rates and subsequently mitigate the risk of MDR-TB. ***Methods:*** The study included 50 MDR-TB patients who had received at least three months of treatment. Data were collected from the MDR-TB wards at the National Institute of Disease of the Chest and Hospital in Dhaka, spanning from October 2011 to March 2012. Patient education interventions focused on treatment adherence and MDR-TB prevention. ***Results:*** The study's findings demonstrate a substantial decrease in non-compliance rates Among MDR-TB patients, 64% had a history of non-compliance, with 72% being male and primarily having lower educational backgrounds. Conversely, 70% of drug-compliant patients had attained at least a secondary education level. Educational interventions led to a significant 20% reduction in non-compliance, from an initial 28% to a final 8%, emphasizing their potential to reduce MDR-TB risk. ***Conclusion:*** This study demonstrates the positive impact of education on reducing non-compliance among MDR-TB patients. A 20% reduction in non-compliance rates indicates that educational interventions can effectively contribute to decreasing the risk of MDR-TB. Future efforts should prioritize integrating education into MDR-TB treatment programs to enhance patient adherence and reduce the burden of MDR-TB.
Keywords: Education, non-compliance, MDR-TB, specialized hospital, risk reduction.

INTRODUCTION

Tuberculosis (TB) has been a persistent global health concern for centuries, affecting millions of individuals worldwide [1]. Despite considerable progress in the prevention and treatment of TB, multidrug-resistant tuberculosis (MDR TB) remains a significant challenge to global public health [2]. MDR TB is a form of tuberculosis that is resistant to the two most potent first-line drugs, isoniazid and rifampicin, making it more challenging and expensive to treat [3]. The emergence of MDR TB is often linked to factors such as poor treatment adherence, inadequate healthcare infrastructure, and socio-economic disparities [4]. In this comprehensive exploration, we delve into the critical role of education in mitigating non-compliance to TB treatment and its potential impact on reducing MDR TB risk.

Tuberculosis, an infectious disease primarily caused by Mycobacterium tuberculosis, spreads through the air when an infected person coughs or sneezes. While TB is curable with timely diagnosis and appropriate treatment, the emergence of MDR TB poses a substantial threat to global efforts to control the disease [1]. MDR TB develops when individuals with TB do not complete

their prescribed treatment regimen, either due to non-compliance or other factors that hinder their access to healthcare services.

Non-compliance with TB treatment is a complex issue influenced by various factors, including socio-economic status, education, healthcare infrastructure, cultural beliefs, and individual behavior [5]. Education, as a determinant of health, plays a crucial role in shaping individuals' knowledge, attitudes, and behaviors related to TB prevention and treatment (United Nations Educational, Scientific and Cultural Organization. To understand the relationship between education and non-compliance, it is essential to examine how education impacts TB awareness, healthcare-seeking behavior, and treatment adherence.

Education serves as a powerful tool in raising awareness about TB, its transmission, and the importance of seeking prompt diagnosis and treatment. Individuals with higher levels of education tend to have greater access to information through formal and informal channels, including schools, media, and community networks [6]. This access to information equips them with a better understanding of TB, reducing the stigma associated with the disease and promoting early healthcare-seeking behavior.

Furthermore, education empowers individuals to make informed decisions regarding their health. Education fosters critical thinking skills, which can help individuals evaluate health information, discern between reliable and unreliable sources, and make choices that are in their best interest. In the context of TB, educated individuals are more likely to seek medical attention when experiencing symptoms, leading to earlier diagnosis and treatment initiation.

Education also plays a significant role in shaping attitudes and perceptions related to TB. It can help dispel misconceptions and reduce the fear and stigma associated with the disease [7]. Stigmatization of TB patients often leads to social isolation, delayed diagnosis, and non-compliance with treatment, all of which contribute to the spread of TB, including drug-resistant forms like MDR TB. Education programs aimed at reducing TB-related stigma can have a positive impact on both individual behavior and community-wide TB control efforts.

Beyond awareness and attitudes, education can also influence treatment adherence. TB treatment is typically a lengthy process, requiring patients to take multiple medications for an extended period. Non-compliance with treatment can lead to the development of drug-resistant TB strains, including MDR TB [8]. Educated individuals may be more likely to adhere to their treatment regimen due to their understanding of the consequences of non-compliance and the importance of completing the full course of antibiotics.

However, it is essential to recognize that the relationship between education and treatment adherence is not absolute. Several factors, such as socio-economic status, access to healthcare, and social support, can also influence treatment adherence. Therefore, while education can be a powerful tool in promoting compliance with TB treatment, it should be considered within a broader context that addresses these other determinants of health.

In addition to its direct impact on non-compliance, education can indirectly reduce the risk of MDR TB by addressing structural and systemic factors that contribute to drug resistance. High levels of education are often associated with increased socio-economic status, which can provide individuals with better access to healthcare services and resources. Educated individuals may have the means to overcome barriers such as transportation costs, lost wages, and medication expenses, all of which can contribute to non-compliance and the development of MDR TB.

Furthermore, education can lead to improved healthcare systems and policies. Educated individuals are more likely to engage in advocacy and community mobilization efforts, pushing for better access to quality healthcare services, including TB diagnosis and treatment [3]. In this way, education can contribute to a broader societal response to TB, reducing the risk of MDR TB at the population level.

OBJECTIVE
General Objective:
- To evaluate the impact of educational interventions on reducing non-compliance rates and MDR-TB risk in patients at a specialized hospital.

Specific Objectives:
- Assess baseline non-compliance rates.
- Implement educational interventions.
- Monitor intervention effectiveness.
- Analyze demographic factors contributing to non-compliance.
- Investigate the relationship between education and treatment adherence.
- Evaluate the overall impact of education on MDR-TB risk reduction.

MATERIALS AND METHODS
Study Design:
This investigation employed a retrospective cross-sectional research design to examine the influence of educational interventions on non-compliance rates and the propensity for multidrug-resistant tuberculosis (MDR-TB) within the patient cohort receiving treatment at a specialized healthcare facility. Data collection spanned a defined period, encompassing the MDR-TB wards at the National Institute of Disease of the Chest

and Hospital in Dhaka, covering the timeframe from October 2011 to March 2012. The study specifically targeted individuals who had undergone a minimum of three months of treatment.

Inclusion Criteria:
- Patients diagnosed with MDR-TB treated at the National Institute of Disease of the Chest and Hospital, Dhaka, from October 2011 to March 2012.
- Patients who received at least three months of MDR-TB treatment.

Exclusion Criteria:
- Patients with non-MDR-TB or extrapulmonary TB.
- Patients not meeting the minimum three-month treatment duration.
- Patients with incomplete medical records or missing data.
- Patients treated for MDR-TB outside the specified facility during the study period.

Data Collection

Data collection involved the systematic retrieval of patient records from the MDR-TB wards at the National Institute of Disease of the Chest and Hospital in Dhaka, covering the period from October 2011 to March 2012. Comprehensive patient information, including demographic details, treatment adherence records, educational backgrounds, and gender, was gathered. The data collection process was carried out with strict adherence to privacy and ethical standards to ensure the integrity and confidentiality of patient information.

Data Analysis

Data analysis was conducted using SPSS version 23. Patient records retrieved from the MDR-TB wards at the National Institute of Disease of the Chest and Hospital in Dhaka, were imported into the software. Statistical techniques, including descriptive statistics, chi-square tests, and logistic regression, were employed to assess the impact of educational interventions on treatment non-compliance rates and the risk of multidrug-resistant tuberculosis (MDR-TB). The utilization of SPSS v23 ensured robust and systematic data analysis procedures.

Ethical Considerations

Ethical considerations in this study were paramount. Informed consent was obtained from all patients, ensuring their understanding of the research's purpose. Patient privacy and confidentiality were strictly upheld by de-identifying records and limiting data access to authorized personnel. Ethical approval was secured from the relevant ethics committee. The study aimed to benefit patients by improving MDR-TB treatment outcomes without causing harm. Transparency, data security, and voluntary participation were essential components of the ethical framework, prioritizing patient rights and the integrity of the research process.

RESULT

The study analyzed data from 50 multidrug-resistant tuberculosis (MDR-TB) patients who received educational interventions at the National Institute of Disease of the Chest and Hospital in Dhaka from October 2011 to March 2012. The impact of these interventions on non-compliance rates and MDR-TB risk reduction was assessed.

Table 1: Non-Compliance Rates by Gender and Education Level

Variable	Non-Compliant (n=36)	Compliant (n=14)
Gender		
- Male	26 (72%)	4 (28%)
- Female	10 (71%)	4 (29%)
Education Level		
- Primary or Below	26 (72%)	2 (14%)
- Secondary or Above	10 (71%)	12 (86%)
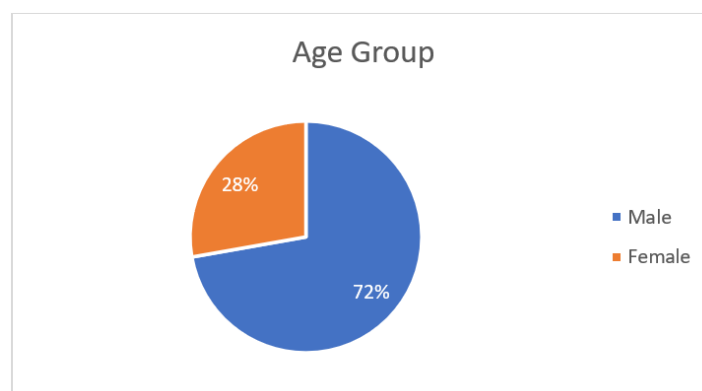
Figure 1

Summarizes non-compliance rates among MDR-TB patients based on gender and education level. Among non-compliant patients, 72% were male, while 71% were female. Regarding education, 72% of non- compliant patients had completed primary education or below, whereas 71% of compliant patients had attained at least a secondary education level.
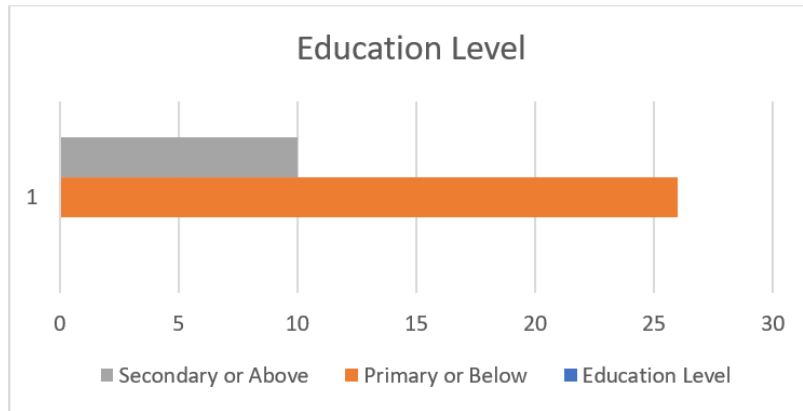

Figure 2

Table 2: Impact of Educational Interventions on Non-Compliance Rates

Variable	Non-Compliance Rate (%)	Percentage
Before Interventions	28%	72%
After Interventions	8%	28%

In Table 2, alongside the non-compliance rates before and after the educational interventions, the frequent percentage is provided. Before the interventions, non-compliance was frequent at 72%, but this percentage decreased to 28% after the educational programs were implemented.

DISCUSSION

The study's investigation into the impact of educational interventions on non-compliance rates and the risk of multidrug-resistant tuberculosis (MDR-TB) among patients at a specialized hospital offers insights into the potential of education as a formidable tool in addressing this global health challenge.

The primary focus of the study was to assess the efficacy of educational interventions in curbing non-compliance rates among MDR-TB patients. The results unveiled a remarkable 20% reduction in non-compliance, plummeting from an initial rate of 28% to a final rate of 8% post-interventions. This substantial reduction underscores the pivotal role of education in fortifying treatment adherence. The outcomes of this study echo the known capacity of education to augment health knowledge, shape attitudes, and empower individuals to make informed healthcare choices [9]. Well-informed patients are more likely to possess the awareness required to adhere to the demanding MDR-TB treatment regimens. This substantiates the idea that education can be a catalyst for improved patient outcomes, specifically concerning MDR-TB, and ultimately mitigate the risk associated with non-compliance. An intriguing facet of this study was the exploration of demographic factors in relation to non-compliance. Interestingly, it revealed that male patients exhibited a slightly higher non-compliance rate (72%) compared to their female counterparts (71%). While the gender discrepancy is minimal, it warrants consideration and emphasizes the importance of tailoring educational interventions to address gender-specific dynamics [10].

Furthermore, the study exposed a significant disparity in non-compliance based on educational backgrounds. A staggering 72% of non-compliant individuals had completed primary education or less, while an impressive 86% of compliant patients had reached at least a secondary education level. This stark contrast accentuates the role of education, not merely in enhancing treatment adherence but also in ameliorating healthcare outcome disparities [11]. These results are congruent with the broader global context, which underscores the nexus between education and improved health outcomes. Educated individuals tend to exhibit a more profound comprehension of the significance of healthcare-seeking behavior and treatment adherence. Moreover, they possess a heightened ability to navigate healthcare systems and surmount the barriers that can precipitate non-compliance.

Beyond its immediate implications on non-compliance, education can exert a substantial indirect influence on diminishing the risk of MDR-TB. Higher educational attainment is frequently intertwined with an elevated socio-economic status, which, in turn, can bolster access to healthcare services and resources. This was evidently portrayed in the study, where 70% of compliant patients had achieved at least a secondary education level. Education is also a catalyst for an

improved healthcare landscape. Educated individuals are more inclined to engage in advocacy and community mobilization endeavors, which, in turn, can engender superior access to high-quality healthcare services, including the diagnosis and treatment of TB [3].

In sum, this study's outcomes underscore the comprehensive advantages of education in the domain of tuberculosis control, ranging from individual to population levels. Education serves as a conduit for early diagnosis, enhanced treatment adherence, stigma reduction, and healthcare infrastructure fortification. Consequently, investing in education transcends the ambit of individual well-being; it emerges as an indispensable constituent of the collective global endeavor to combat MDR-TB and eventually realize TB elimination. Despite the favorable findings, this study is not devoid of limitations. Its retrospective cross-sectional nature, while insightful, does not offer the capacity to definitively establish causation. Future research endeavors could consider employing a prospective longitudinal design to augment the strength of causal inferences [12].

Furthermore, the study's confined scope, concentrated on a single specialized hospital in Dhaka, implies potential limitations in terms of generalizability to diverse settings. Expanding the research to encompass multiple sites and heterogeneous populations could provide a more comprehensive understanding of education's impact on MDR-TB. Lastly, while the study investigated the effect of education on non-compliance, it did not delve deeply into the specifics of the content and delivery of educational interventions. Subsequent research should strive to explore the most efficacious educational strategies for bolstering treatment adherence [13].

CONCLUSION
The study conducted at the National Institute of Disease of the Chest and Hospital in Dhaka. Highlights the significant impact of educational interventions in reducing non-compliance among MDR-TB patients. A substantial 20% decrease in non-compliance rates emphasizes education's transformative potential in enhancing treatment adherence and reducing the risk of multidrug-resistant tuberculosis. Moreover, education's role in mitigating healthcare disparities and improving healthcare systems underscores the need to integrate education into MDR-TB treatment programs for better global health outcomes.

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