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Effectiveness cognitive behavioral therapy in reducing psychological stress and increasing medication compliance in pulmonary tuberculosis patients: A systematic review

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Abstract

Background: Tuberculosis not only affects the physical condition of sufferers but also causes psychological problems such as anxiety and depression in tuberculosis patients. These psychological disorders will have an impact on treatment that is still undergoing treatment. The efforts that can be given are non-pharmacological therapy, namely Cognitive Behavioral Therapy (CBT), this therapy is carried out by changing the wrong way of thinking about the disease experienced by the patient.
Purpose: To determine the effectiveness of Cognitive Behavioral Therapy (CBT) in reducing psychological stress and increasing medication compliance in pulmonary tuberculosis patients.
Method: A systematic review with article selection guided by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. The systematic review process begins with the formulation of clinical questions relevant to the topic. Before this, the authors establish PICOS criteria, which stand for: P (problem, patient, or population), I (intervention, prognostic factor, or exposure), C (comparison or control), O (outcome), and S (study design). For this article, P: Patients diagnosed with pulmonary tuberculosis who experience psychological stress, I: Cognitive Behavioral Therapy (CBT), C: Standard care or conventional treatment without CBT, O: Reduction in psychological stress (levels of stress, anxiety, or depression), S: Randomized Controlled Trials. The article search was conducted systematically using the keywords: "Tuberculosis" AND "Cognitive Behavioral Therapy" AND "Cognitive Therapy" AND "Medication Adherence" AND "Medication Compliance" AND "Psychological "AND "Depression" AND "Anxiety".
Results: This study shows that Cognitive Behavioral Therapy (CBT) is effective in reducing psychological stress and increasing medication compliance in pulmonary tuberculosis patients.
Conclusion: CBT is effective in increasing medication adherence in pulmonary tuberculosis patients.

Keywords: Adherence; Cognitive Behavior Therapy; Psychological; Stress; Tuberculosis.

INTRODUCTION

Tuberculosis is an infectious disease that is still a significant global health problem, including in Indonesia. Cases of pulmonary tuberculosis in the world continue to experience a drastic spike in new cases from year to year. in various countries. Currently, Indonesia is the second highest country after India, Indonesia contributes around 10% of the world's total cases. The report also noted that around 68% of the increase in pulmonary tuberculosis cases in the world came from Indonesia, with the number of cases increasing from 10 million in 2020 to 10.6 million in 2022 (World Health Organization, 2024).

The significant increase in pulmonary tuberculosis cases indicates persistent challenges in early detection, treatment adherence, and public health infrastructure. Such trends underscore the

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importance of integrating both medical and psychosocial strategies, including patient education and psychological support like Cognitive Behavioral Therapy, to improve treatment outcomes (Falzon, Miller, Law, Floyd, Arinaminpathy, Zignol, & Kasaeva, 2025).

Tuberculosis remains a major health challenge in Indonesia, so the government and the community are committed to achieving the target of eliminating pulmonary tuberculosis by 2030. Based on data from KNCV Indonesia 2024 (*KNCV, 2024*), the Indonesian population affected by pulmonary tuberculosis is estimated at 1.08.000 people with 125.000 deaths per year in 2024. Based on the results of the tuberculosis Inventory Study in Indonesia in the 2016–2017 period, an inventory study was conducted which showed that around 41% of tuberculosis cases were not recorded in the reporting system (under-reporting). Both the first time and repeated cases in private health care facilities and in health facilities at the Community Health Center level (Arda, Hanapi, Nur, Mohamad, & Anom, 2025).

According to the Ministry of Health of the Republic of Indonesia, tuberculosis treatment lasts for 6 months, namely 2 months of intensive phase and 4 months of continuation phase. Long treatment causes stress for tuberculosis patients. Stressful conditions that are not immediately intervened can affect the patient's psychological condition which will worsen so that it can be detrimental to patients such as anxiety, depression, frustration and even some patients intend to commit suicide. This will affect the quality of life related to stigma and quality of life during treatment (Kiranti & Andriani, 2024).

Decreased motivation in undergoing treatment can increase the risk of depression and worsen the quality of life of patients. Tuberculosis patients who experience psychological disorders will experience a decrease in quality of life as measured by the World Health Organization Quality of Life (WHOQOL) (Mulyana, 2019). Social stigma against tuberculosis also contributes to emotional distress characterized by depression, sadness, doubt, anger, fear of rejection and distancing). Depression and anxiety are common mental disorders and are the center of global community attention, especially in tuberculosis patients because an increase in one risk can trigger an increase in another risk, therefore patients need intervention both pharmacologically and non-pharmacologically (Sariem, Dapar, Jimam, & Aguiyi, 2022).

The chronic nature of TB, coupled with social stigma, prolonged treatment, and side effects of medication, often exacerbates mental health challenges, leading to poor treatment adherence and lower quality of life. Therefore, integrating both pharmacological interventions, such as antidepressants or anxiolytics, with non-pharmacological approaches like Cognitive Behavioral Therapy (CBT) or counseling, is crucial. Such a combined approach not only alleviates psychological symptoms but also supports patients in maintaining consistent treatment, improving overall recovery rates, and addressing the interconnected risks of mental and physical health deterioration (Rangkoratat, Suhita, & Anggraini, 2024).

One of the non-pharmacological therapies in the form of psychological intervention that can improve compliance, quality of life, and reduce psychological stress is Cognitive Behavioral Therapy (CBT) This intervention aims to reduce anxiety, depression, and is able to increase compliance in taking medication in patients who have chronic diseases, one of which is pulmonary tuberculosis (Vasiliu, Martinez, Gupta, Hamada, Ness, Kay, & Mandalakas, 2024). Cognitive Behavioral Therapy (CBT) is a short-term psychotherapy method that changes negative cognitions by changing the patient's thoughts, beliefs and behaviors to eliminate negative emotions and behaviors. Currently Cognitive Behavioral Therapy (CBT) is widely applied in clinical practice and research on people suffering from psychological problems (Goig, Windels, Loiseau, Stritt, Biru, Borrell, & Gagneux, 2025).

RESEARCH METHOD

A systematic review with article selection guided by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. The systematic review process begins with the formulation of clinical questions relevant to the topic. Before this, the authors establish PICOS criteria, which stand for: P (problem, patient, or population), I (intervention, prognostic factor, or exposure), C (comparison or control), O (outcome), and S (study design). For this article, P: Patients diagnosed with

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pulmonary tuberculosis who experience psychological stress, I: Cognitive Behavioral Therapy (CBT), C: Standard care or conventional treatment without CBT, O: Reduction in psychological stress (levels of stress, anxiety, or depression), S: Randomized Controlled Trials.

The article search was conducted systematically using the keywords: "Tuberculosis" AND "Cognitive Behavioral Therapy" AND "Cognitive Therapy" AND "Medication Adherence" AND "Medication Compliance" AND "Psychological "AND "Depression" AND "Anxiety".

The inclusion criteria inquired Patients with pulmonary tuberculosis undergoing OAT treatment who received Cognitive Behavioral Therapy (CBT) intervention, either individually or in groups, face-to-face or online, with outcomes assessing psychological stress and/or medication adherence, type of research: RCT, quasi-experimental, or cohort/prospective study. Full-text articles in English/Indonesian, published within the last 10 years. The exclusion criteria included Patients with extrapulmonary TB or drug-resistant TB (MDR/XDR-TB) if the focus of the study is more on pharmacology rather than CBT, studies that are only reviews, editorials, letters to the editor, or case reports, articles that only discuss CBT for other chronic diseases without specific data on TB patients.

The initial search resulted in PubMed, Sage, Scopus, and Google Scholar. After screening and filtering based on the predefined criteria, 5 articles met the inclusion criteria and were selected for further analysis.

RESEARCH RESULTS

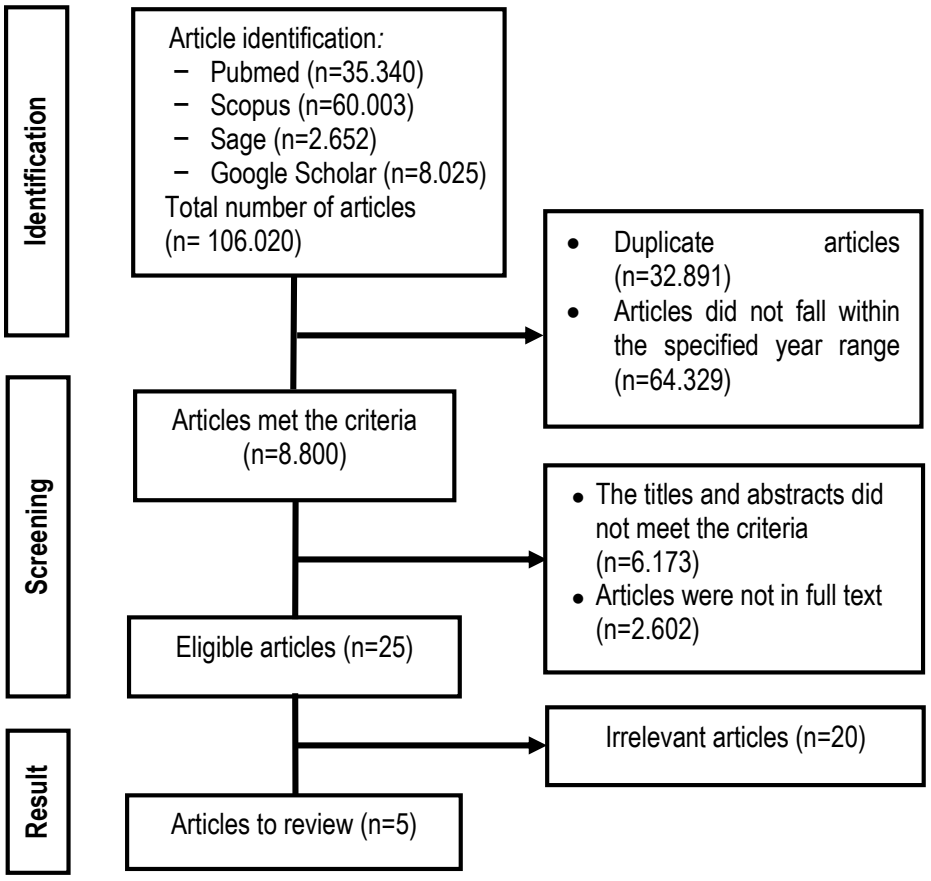


Figure PRISMA Flow Diagram

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Table The Main Characteristics of Included Studies

Author (Year) (Country)	Purpose	Methods	Results
(Zuo et al., 2022) (China)	To demonstrate the effect of cognitive behavioral therapy (CBT) in reducing psychological stress in dealing with the disease and the quality of life of pulmonary tuberculosis patients.	RCT	There were a total of 454 participants until the final analysis stage. After 2 months of CBT intervention, the CBT group had a GAD-7 score that was 1.72 lower than the control group (1.47 - 1.99), the PHQ-9 score of the CBT group was 2.05 lower than the control group (7.9 - 13.5). In patients with different levels of anxiety and depression, only those in the intervention group who had symptoms of anxiety and depression and were moderate showed a significant decrease in anxiety and depression scores after the intervention.
(Sariem et al., 2022) (Nigeria)	Determining the influence of Cognitive and Behavioral Interventions (based on the Information-Motivation -Behavioral model) Skills /IMB) on the results of Tuberculosis treatment.	Cross Sectional	There are 25 question items to assess the cognition and behavior of pulmonary TB patients towards treatment by applying the information motivation behavior skills model. The purpose of its application is to increase compliance. The results obtained y = 0.878, correlation between items: 0.542 - 0.726. Where the cronbach value alpha (y) for consistency is 0.864, above the minimum value of 0.7. So, this item can measure the cognition and behavior of TB patients towards their disease. By using a cognitive intervention model scientifically, it can reduce and validate 25 items used to design cognitive and behavioral interventions that have an impact on tuberculosis treatment outcomes.
(Altankhuyag et al., 2024) (Mongolia)	Evaluating the effects of cognitive behavioral therapy (CBT) on psychological status and risk of Lost to Follow Up (LFTU) during MDR-TB treatment in Mongolia	RCT	Respondents who Undergoing MDR TB treatment, depression and anxiety levels decreased by 12% and 16% respectively in the intervention group. However, in the control group, depression levels decreased by 8.5%. While the success rate of treatment was 8% higher and Lost to Follow Up (LFTU) to five times lower in the intervention group than in the control group. So, in this study CBT was effective in reducing psychological stress and reducing the risk Lost to Follow Up.

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Author (Year) (Country)	Purpose	Methods	Results
(Kurniasih, 2016) (Indonesia)	To determine the effect of counseling using the CBT method on medication compliance in pulmonary TB patients.	Quasi Experimental	The intervention group that received CBT counseling had a 36 times greater chance of being compliant with treatment than patients who did not receive CBT counseling, with Odds Ratio (OR) of 36.470 and P value of 0.000. The intervention group underwent CBT counseling for 30 minutes 3 times in 28 days.
(Andriani et al., 2022) (Indonesia)	To determine the effect of CBT on self-stigma that affects emotions such as depression, sadness, doubt and feelings of fear of self-rejection. and quality of life that includes psychology.	Quasi Experimental	The highest percentage of self-stigma values in the pre -CBT group was in the moderate category of 53.3% and in the control, group was in the moderate category of 66.7%. After post -CBT, the highest number of stigmas in the control group was moderate, 83.3% and in the control, group was moderate, 63.3%. While in the quality of life before CBT, the intervention group was in the moderate category of 63.3% and the control group was in the moderate category of 100%. After receiving CBT, the quality of life in the intervention group was 100% and there was no change in the control group.

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DISCUSSION

From the results of the study, 5 articles showed that CBT consistently showed that tuberculosis patients often experience psychological disorders such as depression, anxiety, stress. These psychological disorders have a major impact on low quality of life, thus reducing medication compliance. *Cognitive Behavioral Therapy (CBT)* analyzed from these five articles has proven effective in overcoming various psychological problems and non-compliance in tuberculosis patients. This therapy works to change negative thought patterns so that patients become more positive and rational in dealing with tuberculosis. The reviewed studies consistently highlight that CBT not only alleviates psychological distress but also strengthens patients' self-efficacy and motivation to adhere to long-term treatment regimens. Maladaptive beliefs and promoting healthier coping mechanisms, CBT empowers tuberculosis patients to manage stigma, reduce anxiety and depression, and sustain adherence despite the lengthy and demanding nature of anti-TB therapy. This dual impact improving mental well-being and treatment compliance demonstrates the essential role of CBT as an adjunctive intervention in comprehensive tuberculosis care, ultimately contributing to better health outcomes and reducing the risk of treatment failure or drug resistance (Coussens, Zaidi, Allwood, Dewan, Gray, Kohli, & Yi, 2024).

Cognitive Behavioral Therapy (CBT) has been widely recognized as an effective psychological intervention to reduce psychological stress in patients with chronic illnesses, including tuberculosis. In the context of pulmonary tuberculosis, stress often arises from prolonged treatment duration, social stigma, and fear of transmission or relapse. CBT addresses these issues by helping patients identify and restructure negative or irrational thoughts, which often trigger heightened stress responses. Through guided sessions, patients learn to replace maladaptive thinking patterns with more constructive and rational perspectives, leading to improvements in emotional regulation, reduced anxiety, and a more optimistic outlook toward their treatment and recovery process (Phelps, Lethbridge, Brennan, Bryant, Burns, Cooper, & Silove, 2022).

CBT emphasizes the development of coping skills and problem-solving strategies, enabling patients to better manage daily stressors related to their illness. Techniques such as relaxation training, cognitive reframing, and behavioral activation are incorporated to reduce physiological symptoms of stress while fostering resilience and self-efficacy. This not only minimizes psychological distress but also enhances patients' capacity to engage in healthier behaviors, improving overall quality of life. In tuberculosis care, the reduction of psychological stress through CBT is particularly valuable, as it helps prevent the negative mental health consequences that often interfere with adherence to therapy and long-term treatment success (Walker, Khanal, Hicks, Lamichhane, Thapa, Elsey, & Newell, 2018).

Cognitive Behavioral Therapy (CBT) has been shown to significantly improve medication compliance among tuberculosis patients by addressing the psychological and behavioral barriers that often interfere with treatment adherence. Many patients struggle with negative emotions, stigma, or misconceptions about their illness, which can lead to missed doses or premature discontinuation of therapy. Patients are guided to recognize and restructure irrational beliefs, manage stress, and develop problem-solving skills that encourage more consistent health behaviors. This process fosters a sense of personal responsibility and control, making patients more likely to follow medical recommendations and complete the full course of anti-tuberculosis treatment (Schmidt, Fairlie, Hellstrom, Luabeya, Middelkoop, Naidoo, & Hatherill, 2025).

CBT promotes positive reinforcement and goal setting, which strengthen patients' motivation to adhere to their medication schedules. Regular sessions allow individuals to reflect on their progress, identify obstacles to adherence, and apply coping strategies in real-life situations. By enhancing patients' self-awareness and resilience, CBT not only reduces the risk of non-compliance but also improves overall treatment outcomes, including faster recovery and reduced likelihood of drug resistance. Integrating CBT into tuberculosis management can serve as a valuable complement to pharmacological treatment, ensuring holistic care

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that addresses both psychological well-being and medical adherence (Chai, Li, Deng, Ma, Zhou, Chen, & Lei, 2025).

CBT can be implemented in various forms, such as individual sessions, group therapy, or even digital and telehealth-based interventions, depending on the resources available and the patient's circumstances. In tuberculosis patients, individual sessions may provide a safe space to address personal fears, stigma, or psychological distress, while group-based CBT can foster peer support and normalize the treatment experience. Digital platforms, including mobile applications or online counseling, offer additional flexibility, especially in areas with limited healthcare access, ensuring that psychological support can reach patients undergoing long and challenging treatment regimens (Dartois, Mizrahi, Savic, Silverman, Hermann, & Barry, 2025).

The duration and intensity of CBT are also adaptable, ranging from brief interventions over a few weeks to more extended programs lasting several months. Short-term CBT may focus on immediate stress reduction and motivation for treatment adherence, while longer-term sessions can target deeper cognitive restructuring and lifestyle adjustments. Tailoring the therapy's length and format to the patient's psychological condition, socio-cultural context, and health system capacity is crucial to maximize its effectiveness. Such flexibility ensures that CBT remains a practical and sustainable approach to improving both mental health and medication compliance in tuberculosis care (Jamshidi, Danaei, Arbabi, Mohammadzadeh, Khelghati, Akbari, & Migliori, 2025).

CONCLUSION

CBT can relieve psychological stress in the form of anxiety, depression that can affect the quality of life of pulmonary TB patients. CBT therapy can be carried out on individuals, groups and communities. For better results, CBT can also be combined with other therapies, one of which is Information-Motivation-Behavioral Skill (IMB) especially for medication compliance.

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