

Comprehensive Tuberculosis Management to Improve Self-Management and Physical Health Status: A Systematic Review

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Abstract--- *One of the problems in tuberculosis treatment is nonadherence in undergoing treatment, which has an impact on physical health status. Physical health status is affected by physical, psychological, social and spiritual changes. The purpose of this review is to explain interventions that can improve tuberculosis self-management in improving physical health status. Six databases were used including Scopus, CINAHL, ProQuest, ScienceDirect, and Google Scholar using the keywords "tuberculosis", "pulmonary tuberculosis", "self-management", "intervention" and "treatment". Journal searches were limited to 2015-2020 using Bahasa and English. We identified 1387 articles of which 16 were systematically relevant to this review. This study found that efforts to improve self-management and health status of tuberculosis patients were divided into five categories of interventions. The interventions include physical interventions, psychological interventions, social interventions, spiritual interventions and comprehensive management of tuberculosis. The present review shows that, to achieve an increase in physical health status in tuberculosis patients, a comprehensive intervention is needed. The paper emphasizes the need for more research on efforts to improve the physical health status of tuberculosis patients.*

Keywords--- *Intervention; Pulmonary Tuberculosis; Self-Management; Tuberculosis*

I. INTRODUCTION

Pulmonary tuberculosis is caused by *Mycobacterium tuberculosis* which attacks the respiratory system. Signs and symptoms that appear are chest and muscle pain; weight and appetite loss; shortness of breath; coughing lasting ≥ 2 weeks; a fever lasting ≥ 1 week; and night sweats in the absence of activity [1]. Tuberculosis is a health problem, especially in the community, although anti-tuberculosis drugs and BCG vaccines have been given [1]. One of the main problems in controlling tuberculosis is adherence to treatment [2]. Tuberculosis has an impact on the patient's economy, nutritional status, exercise tolerance, muscle strength, perceived physical and psychological changes during treatment, especially in the early treatment stage, and quality of life [3], [4].

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The World Health Organization (WHO) reports that there are 10.4 million people diagnosed with pulmonary tuberculosis with a death rate of 1.7 million in 2016 [3], [5]. Indonesia ranks second with a total of 330,910 cases [3]. Globally, one-third of the world's population is infected by tuberculosis (TB) bacteria even though they are asymptomatic [5].

The increase in the number of people with tuberculosis is caused by many factors, including low socioeconomic levels, poor sanitation, population densities, malnutrition, low levels of education, income below regional wage, alcohol, smoking, and comorbidities such as HIV AIDS and diabetes mellitus [3]. Tuberculosis affects the patient's economy, nutritional status, exercise tolerance, muscle strength, perceived physical and psychological changes during treatment, especially in the early treatment stage, and quality of life [3], [4]. Other problems arising from tuberculosis include impacted physical functions and stigma, which can lead to emotional issues. The self-efficacy of patients concerning health-seeking behavior and treatment of adherence has been demonstrated to be affected by physical and emotional changes [1].

Although the WHO has recommended the Direct Observed Treatment Short-Course (DOTS) as a strategic step in tackling tuberculosis in the world, several problems arise after treatment, including falling body weight, progressive morbidity, and increased mortality, accelerated by accompanying anxiety, depression, and social isolation. Symptoms are such as breathlessness, fatigue that comes with deconditioning, demotivation, and psychosocial isolation [5], [6]. The Direct Observed Treatment Short-Course (DOTS) strategy is not enough to solve problems in tuberculosis or post-tuberculosis patients. Self-management intervention is needed to reduce physical complaints and increase physical activity in patients with chronic disease [3]. The purpose of this review was to explain interventions that can improve tuberculosis self-management in improving physical health status.

II. METHODS

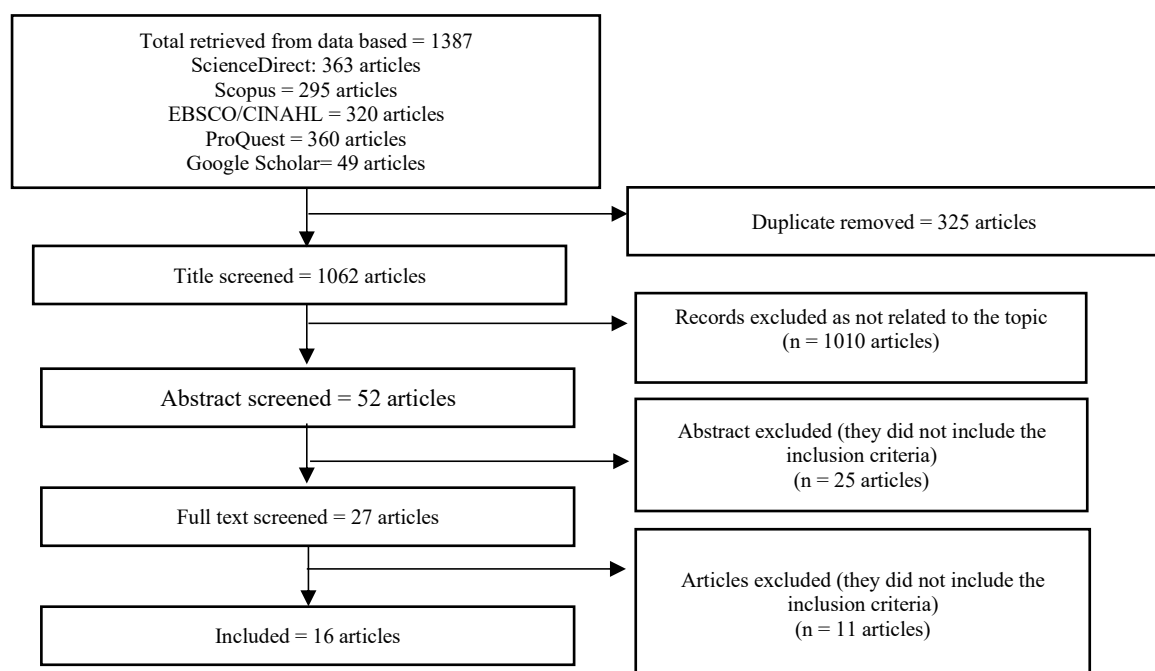


Figure 1. Search Strategy

A systematic review was aimed at explaining interventions that can improve tuberculosis self-management in improving physical health status. A literature search was carried out in several databases such as Scopus, ProQuest, ChinaHL, Google Scholar and ScienceDirect by entering the keywords intervention, treatment, tuberculosis, and pulmonary tuberculosis. The use of limited years is five years (2015-2020). The inclusion criteria for the article are articles in the form of experimental studies in patients with active, latent or post-tuberculosis; qualitative research; interventions that affect self-management, quality of life and physical health status in patients included in physical, social, psychological, spiritual and comprehensive management. Articles would be excluded if the articles were in the form of descriptive, non-experimental research and did not explain the effect of the intervention on self-management, quality of life and physical health status. The searched results based on these criteria obtained 16 selected articles from 1,387 articles found.

III. RESULTS

We collected 16 selected articles from 1,387 articles found. Three articles were describing physical therapy intervention, three social intervention articles, two psychological intervention articles, three spiritual intervention articles and four articles on comprehensive management of tuberculosis which contained interventions. The articles we analyzed consisted of 10 journals using RCT designs, one journal using a prospective cohort design two quasi-experiment one pre-experimental journal, and one mixed-method design journal. We then grouped the results obtained into five intervention categories, namely physical therapy intervention, psychological intervention, social intervention, spiritual intervention, and comprehensive management of tuberculosis, which is a program consisting of several interventions.

Table 1. Categorizing the articles' findings

Category	n
Year of Publishing	
2016	2
2017	3
2018	8
2019	2
2020	1
Type of Participants	
Pulmonary Tuberculosis	11
Tuberculosis and HIV	1
Post-Tuberculosis	2
Pulmonary Disease	2
Type of Study	
RCT	10
Quasi-experiment design	2
Pre experimental design: pre and post-intervention	2
Prospective cohort design	1
Mixed method	1
Category	
Physical therapy intervention	3
Psychological intervention	2
Social intervention	3
Spiritual intervention	3
Comprehensive management of tuberculosis	5

Table 2 Overview of the included study

Author & Year	Design	Sample	Outcomes
(Thokchom, Gulati, Ray, Menon, & Rajkumar, 2018)	RCT	53 participants	There was a drastic increase in lung capacity after treatment, such as: FEV1 (forced expiratory volume in 1 s) of 53.19% baseline 1.90 ± 0.10 ; FVC (forced vital capacity) 26.23% baseline 3.08 ± 0.13 and FEV1 / FVC 10.60% baseline 61.15 ± 2.60
(Martín-Salvador, et al., 2016)	RCT	44 participants	$p = 0.041$ in reduction of dyspnea, increase in right and left quadriceps muscle strength $p = 0.008$ and $p = 0.010$
(Nogas, Grygus, Nagorna, Stasiuk, & Zukow, 2019)	RCT	68 participants	Improved pulmonary function increased by $p < 0.05$, VC in men and women 10.93% and 12.40%, tidal volume 4% for men and women 5.00%, FEV1 increased. Quality of life and health status improved from 50.08 ± 0.54 and became 56.31 ± 0.53 ($p < 0.05$) score.
(Prasetya, Murti, Anantanyu, & Syamsulhadi, 2018)	RCT	60 participants	Participants given hypnosis therapy showed increased adherence to tuberculosis treatment (mean = 53.40, SD = 6.43) compared with those who did not receive hypnosis therapy (mean = 49.37, SD = 8.68) and $p = .045$.
(Walker, et al., 2018)	Mixed quantitative and qualitative approach	197 participants	Qualitative study results: participants report having someone to talk about concerns and concerns and, in this study, researchers can conduct training related to the intervention that will be carried out.
(Bisallah, et al., 2018)	RCT	226 participants	Knowledge increased dramatically in the intervention group $F = (1,218) = 665,889$, $p = 0.001$, time $p = 0.001$, partial $\eta^2 = 0.193$, $d = 1.52$) and interaction between groups with time $F = (3,605, 218) = 34,028$, $p = 0.001$. The attitude increased dramatically, $p = 0.001$, $d = 1.26$.
(Sharma, et al., 2018)	RCT	400 participants	TB scores at 24 weeks (95% CI) were lower in the intervention group [2.07 (1.98, 2.17) versus 2.12 (2.02, 2.21)]. Patients in the control group required treatment extension more often than intervention arm (6.4% vs 2.6%, p -value = 0.02)
(Aryanpur, et al., 2016)	RCT	210 participants	After 6 months of intervention, 71.7% for the combined intervention group, 33.9% for the brief advice group and 9.8% for the control group with $p < 0.001$. Combined intervention group and brief advice group, respectively, had 35 times ($p < 0.001$, OR = 35.26, 95% CI = 13.77–90.32) and 7 times ($p < 0.001$, OR = 7.14, 95% CI = 2.72–18.72)
(Goel, Kathiresan, Singh, & Singh, 2017)	RCT	156 participants	Treatment performed is smoking cessation. The results obtained are smoking cessation in the intervention group were higher than in the control group with $p = 0.427$
(Nihayati, Arganata, Dian, & Yunita, 2019)	Quasi-experimental design	32 participants	The results obtained were the stress level of the treatment group had significance with $p = 0.000$ and the difference between the control group and the intervention group was $p = 0.000$.
(Kusnanto, Haryanto, Sukartini, Ulfiana, & Putra, 2018)	Quasi-experimental design	34 participants	The results showed there were significant differences in PEFR ($p = 0.00$), pulse ($p = 0.00$), oxygen saturation ($p = 0.00$), respiratory rate ($p = 0.00$), respiratory sound ($p = 0.00$), stiffness ($p = 0.00$), human IL-2 ($p = 0.00$), human cortisol ($p = 0.01$), IgG ($p = 0.00$) after intervention in the intervention group.
(Sadipun, et al, 2018)	Pre-experimental with one group pre-posttest design	45 participants	The results showed a significant difference before and after the intervention with $p = 0.000$ (< 0.05)
(Chen, et al., 2020)	RCT	262 participants	Self-management scores in the intervention group increased $\beta_{\text{group time}} = 2.92$, $p < 0.001$, behavior belief $\beta_{\text{group time}} = 0.35$, $p < 0.001$, behavior plan $\beta_{\text{group time}} = 0.72$, $p < 0.001$, and self-efficacy $\beta_{\text{group time}} = 1.85$, $p < 0.001$.
(Singh, et al., 2018)	Prospective cohort study	29 participants	The results showed there was an increase in physical activity in patients after the intervention, such as walking 488 meters at baseline vs 526 meters post-

Author & Year	Design	Sample	Outcomes
(Li, et al., 2018)	RCT	201 participants	intervention with a p-value of 0.033. There is an improvement in the respiratory system, p-value 0.025.
(Jones, et al., 2017)	Pre-post-intervention study	34 participants	Social support for patients in the intervention group increased significantly β group time = 0.61, $p < 0.01$; objective support β group time = 0.15, $P < 0.05$, subjective support, β group time = 0.32, $P < 0.05$ and support utilization β group time = 0.16, $P < 0.05$ The results showed a decrease in chest pain in participants. In the pre-test reported 13/29 (45%) and after intervention 7/29 (24%), mild hemoptysis occurred in 4/29 (17%) participants and 2/29 (7%) at the end of the intervention

It can be seen from Table 2 that TB management to improve physical health status does not only focus on patients who have active TB, but TB control programs have a role to improve health status in TB patients. There are four studies based on the journals that we review that do not have a direct effect on improving health status but change the negative behavior of patients toward the desired health status.

IV. DISCUSSION

Efforts to improve self-management and health status of tuberculosis patients were divided into five categories of interventions. The interventions include physical interventions, psychological interventions, social interventions, spiritual interventions and comprehensive management of tuberculosis. Physical therapy intervention consists of yoga intervention and physical rehabilitation. The purpose of yoga is to eliminate anxiety and have a strong and profound effect on the respiratory system [7]. Patients were given yoga for 50 min daily for two weeks and directed to continue daily yoga practice [7]. Research conducted by Thokchom, Gulati, Ray, Menon, and Rajkumar (2018) states that yoga increases in lung capacity with FEV1 (forced expiratory volume in 1s) of 53.19% baseline 1.90 ± 0.10 ; FVC (forced vital capacity) 26.23% baseline 3.08 ± 0.13 and FEV1 / FVC 10.60% baseline 61.15 ± 2.60 . This intervention was only carried out in post-tuberculosis patients and several home visits were needed to determine the effectiveness of the intervention [7], while physical rehabilitation is aimed at tuberculosis patients who are in the hospital [8], [9].

Physical rehabilitation improves lung function in patients with tuberculosis [8]. Physical rehabilitation consists of morning hygienic gymnastics (MHG), therapeutic gymnastics (TH), breathing exercises, therapeutic massage, physiotherapy (UHF-therapy), hydrotherapy, electrostimulation, manipulation intervention exercises with elastic bands relaxation, and educational programs [8], [9]. Research carried out by Nogas, et al. obtained an increase in lung function with an increase in VC of 10.93% in men and 12.40% in women and an increase in tidal volume in men by 4% and 5% in women. In addition to improving lung function, this physical rehabilitation program improves the quality of life and health status in tuberculosis patients [8]. Improved quality of life is evaluated using a questionnaire of quality of life by the World Health Organization (WHOQOL-100), which is based on the results of research by Nogas, et al. (2019) who found an increase in quality of life in tuberculosis patients from a score from 50.08 to 56.31 in men, while in women an increase in quality of life scores from 50.22 to 57.36 [8]. This physical therapy does not cause side effects, but, after discharge, the patient is not monitored when doing therapy [9]. Physical rehabilitation is provided by physiotherapy when the patient is in the hospital, and it will be difficult to evaluate when the patient goes home.

The psychological intervention consists of hypnotherapy and a Psychosocial Support Package. This hypnotherapy is given to improve medication adherence in TB patients [10]. Research conducted by Prasetya, Murti, Anantanyu, and Syamsulhadi (2018) with as many as 60 participants showed increased adherence to tuberculosis treatment (mean = 53.40, SD = 6.43) compared with those who did not receive hypnosis therapy (mean = 49.37, SD = 8.68) and $p = .045$. This therapy can only be given by a certified expert, so nurses who do not have a hypnosis certificate cannot do this therapy. The psychosocial support package is intended for patients with high levels of depression, especially in MDR-TB [7]–[9]. This psychosocial support package consists of a combination of interventions [11]: (1) Information and education, (2) Screening process, (3) Brief Counseling, (4) Support Group, and (5) Training [11]. This intervention involves the family in training, so this intervention is highly recommended because it is sustainable and can be evaluated.

Social intervention consists of health education intervention and smoking intervention. Health education is providing information about tuberculosis, modes of transmission, prevention, risk factors, vulnerability and misconception related to TB. Research conducted by Bisallah shows changes in knowledge, attitude, and practice regarding TB [12]. Health education intervention is carried out by community nurses continuously. The results show that knowledge increased dramatically in the intervention group $F = (1,218) = 665,889$, $p = 0.001$, time $p = 0.001$, partial $\eta^2 = 0.193$, $d = 1.52$ and interaction between groups with time $F = (3,605, 218) = 34,028$, $p = 0.001$. The attitude increased dramatically, $p = 0.001$, $d = 1.26$ [12].

Smoking cessation intervention is an intervention carried out to encourage patients to quit smoking and thus reduce the incidence of unfavorable TB treatment outcomes [13], [14]. There are three types of non-pharmacological interventions carried out, including behavior change counseling, 5A protocol and ABC intervention [13], [16], [17]. Based on the journals reviewed, smoking cessation intervention did not have a direct effect on improving the health status of TB patients. Interventions are for as long as 6 months [13] and often require additional nicotine therapy [17].

The spiritual intervention consists of breath dhikr, Spiritual Emotional Breathing, and Spiritual-Based Mindfulness Intervention. Breath dhikr is based on Roy's adaptation theory which aims to improve the mechanism of positive coping in individuals suffering from TB. [18]. Research conducted by Nihayati, et al. showed that the stress level of the treatment group had significance with $p = 0,000$ and the difference between the control group and the intervention group was $p = 0,000$. [18]. This therapy can be applied at home, but is limited to Muslim patients.

Spiritual Emotional Breathing (SEB) is a therapy using the Spiritual Emotion Freedom Technique (SEFT). Research conducted by Kusnanto showed that there were significant differences in PEFR ($p = 0.00$), pulse ($p = 0.00$), oxygen saturation ($p = 0.00$), respiratory rate ($p = 0.00$), respiratory sound ($p = 0.00$), stiffness ($p = 0.00$), human IL-2 ($p = 0.00$), human cortisol ($p = 0.01$), and IgG ($p = 0.00$) after intervention in the intervention group [19]. This therapy can be done by nurses in hospitals or patients at home. Whereas spiritual based mindfulness intervention uses the STOP technique: (1) S-Stop; (2) T - Take deep and mindful breaths relaxation; (3) O - Observe the present moment; (4) P -Proceed with a smile (process) [20]. Study by Sadipun shows a significant effect of mindfulness with a spiritual approach on emotional control.

Comprehensive management of tuberculosis is a program for TB management consisting of Pulmonary Rehabilitation, Health Action Process Approach (HAPA) and Comprehensive. Pulmonary Rehabilitation is a program aimed at patients who have respiratory problems and clinical disorders that cause limitations on daily activities and quality of life [4]. Pulmonary rehabilitation has been shown to improve symptoms, exercise tolerance and health-related quality of life [21]. This program consists of exercise, psychological counseling, education, nutritional support,

and self-management activities [4], [6], [22]. Pulmonary Rehabilitation is aimed at active TB patients and post-tuberculosis patients whose aim is to improve the functional status and quality of life [4], [22]. The results showed a decrease in chest pain in participants. In the pre-test it reported 13/29 (45%) and after intervention 7/29 (24%), mild hemoptysis occurred in 4/29 (17%) participants and 2/29 (7%) at the end of intervention [6]. Pulmonary rehabilitation is only done in a hospital by physiotherapy with the help of nurses and doctors [4], [6], [22].

The Health Action Process Approach (HAPA) is aimed at tuberculosis patients aged ≥ 65 years. The Health Action Process Approach (HAPA) consists of three components, namely health education, psychotherapy, and self-management intervention [23]. Self-management scores in the intervention group increased β group time = 2.92, $p < 0.001$, behavior belief β group time = 0.35, $p < 0.001$, behavior plan β group time = 0.72, $p < 0.001$, and self-efficacy β group time = 1.85, $p < 0.001$ [23].

Comprehensive social support consists of three interventions, namely health education, psychotherapy, and family and community support interventions. This was carried out by Li, et al. for six months with an intervention frequency of twice per month [14]. Social support for patients in the intervention group increased significantly β group time = 0.61, $p < 0.01$; objective support β group time = 0.15, $P < 0.05$, subjective support, β group time = 0.32, $P < 0.05$) and support utilization β group time = 0.16, $P < 0.05$ [14].

V. CONCLUSION

Self-management, improvement of health status and quality of life in tuberculosis patients are obtained from medication adherence and control, physical interventions to reduce physical symptoms, psychological interventions to reduce anxiety and depression, social interventions to change behavior, spiritual interventions to achieve self-management and comprehensive management that is not only focusing on the biological, but also the psychological, social and spiritual needs of the patient.

CONFLICT OF INTEREST

No conflicting interest has been declared.

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