ORIGINAL ARTICLE

Successful treatment of tuberculosis using a collaborative approach between family and health workers

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Abstract. The optimization efforts of promotion, prevention, provision of preventive treatment, and infection control are strategies to overcome tuberculosis in Indonesia for the period 2020-2024. This research aims to analyze the effects of a collaborative model between health workers and family support to improve the success of treating patients with pulmonary tuberculosis. This is an experimental research using a one-group pre and post-test design. The study samples were TB patients treated at Bainamu and Bontosunggu Public Health Centers, Jeneponto Regency, from June 2021 to January 2022. Using McNemar's statistical test, the data analysis was conducted to determine the differences in patient behavior on factors that support and inhibit the recovery. The results showed that the collaborative model has an impact on eating, healthy living, and spiritual behaviors that support the recovery and cure rate of TB patients.

Introduction

The global commitment to end tuberculosis (TB) is outlined in the End TB Strategy which aims to reduce the number of deaths by 90% in 2030 compared to 2015. In this strategy, the goal is achieved with innovations, such as vaccine development and tuberculosis drugs with short-term regimens (1). Directly Observed Treatment Success Rate (DOTS) is a short-term tuberculosis treatment strategy with supervision, and it is recommended by the WHO to control pulmonary tuberculosis, because it has a cure rate of 95%. However, the target cure rate in Indonesia is 85% and this can be achieved through the active participation of patients to obtain and take medicine regularly (2).

The number of tuberculosis cases has increased in Indonesia, specifically in Jeneponto Regency, during the past three years, with 465, 537, and 605 cases reported in 2017, 2018, and 2019, respectively. Meanwhile, the cure rate fluctuated by 65.12% in 2017, decreased by 55.6% in 2018, and increased to 73.66% in 2019. The complete treatment decreased to 52.82, 52, and 46%, in 2017, 2018, and 2019, respectively (3-5).

According to previous research, several factors affect the cure rate of pulmonary tuberculosis, including the service factors, such as availability of medication, and environmental factors, such as drug supervisor/PMO, contact history, and family support (6,7). Other research concludes that the recovery of pulmonary tuberculosis patients is influenced by age, education background, socio-economic status, nutritional status, stress, knowledge about pulmonary tuberculosis treatment, complications with other diseases, and regularity of treatment (8-10).

Several programs for tuberculosis control were carried out by the government including Directly Observed Treatment Success Rate (DOTS) (11-13). The Aisyiyah Community Tuberculosis Care Program reveals non-governmental health infrastructure and social group dynamics that independently overcome this problems in Indonesia (14), though no optimum success has been reported. This is proven by the cure rate in Jeneponto Regency, which is far from the WHO target of 95%. As such, the development of a collaborative model of family support and health workers is necessary to improve the success of tuberculosis treatment. This model involves family due to the initial treatment when visiting the public health center. The patient receives integrated counseling by tuberculosis, nutrition, environmental health, and health promotion officers about the procedures for taking medication, foods that support and inhibit recovery, home environment, and behaviors that support recovery. Furthermore, counseling is also given to the family to helps health workers monitoring the requirement and factors that can sustain and inhibit the patient's recovery.

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Materials and methods

This was an experimental research using one-group pre- and post-test design (15). During the first stage of intervention, the patient should be accompanied by their immediate family to the public health center to obtain treatment, then they are counseled on taking medication, factors that support and inhibit the recovery, and the prevention of tuberculosis transmission. Health workers has an essential role as health and environmental health promotor as well as nutrition and tuberculosis officers. The counseling materials were prepared in the form of flipcharts and pocketbooks for health workers and TB patients and families, respectively. In addition, the family member used the pocketbook to educate the patient during treatment and it was monitored by TB cadres twice a month. The samples in this research were include 30 TB patients treated at Bainamu and Bontosunggu Public Health Centers, Jeneponto Regency, from June 2021 to January 2022. Furthermore, McNemar's statistical test was used to conduct data analysis to determine the differences in patient behavior on factors that support and inhibit their recovery (16). The analysis of differences before and after the intervention was based on the percentage of cure rates. This research was conducted in Binamu and Bontosunggu Public Health Centers, Jeneponto Regency, South Sulawesi because they had the lowest cure rate.

Ethics consideration. This protocol received ethical approval from the ethics committee of the Faculty of Public Health, Hasanuddin University, Makassar with the code of ethics number 5543/UN4.14.1/TP. 01.02/2022.

Results

Eating behaviors that support the recovery of TB patients. Bivariate analysis was conducted to determine the effects of the collaborative model on eating behavior, which supports the recovery of TB patients. The data was presented in Table I below:

Table I showed that before the intervention, 7 and 23 people were compliant and less compliant, respectively. After the intervention, 1 person changed to less compliant, while 18 people changed to compliant. The results of statistical analysis obtained a P-value of 0.000 using the McNemar test. Therefore, there was a difference in eating behavior that supports the recovery of TB patients before and after the intervention. The collaborative model also has an impact on eating behavior.

Healthy living behaviors that support the recovery of TB patients. Bivariate analysis was conducted to determine the impact of the collaborative model on healthy living behavior. The data was presented in Table II below:

Table II depicts that before the intervention, 13 and 17 people were compliant and less compliant, respectively. Furthermore, 1 person changed to less compliant, while 14 people changed their behavior to compliant after the intervention. The results of statistical analysis obtained a P-value of 0.001 using the McNemar test. Therefore, there was a difference in clean living behavior that support the recovery of TB patients before and after the intervention. The collaborative model also has an impact on clean living behavior.

Spiritual behaviors that support the recovery of TB patients. Bivariate analysis was conducted to determine the effects of the collaborative model on spiritual behavior that supports the recovery of TB patients. The data was presented in Table III below:

Table III showed that before the intervention, 10 and 20 people were compliant and less compliant, respectively. However, 13 people changed their behavior to compliant, while 1 person changed to less compliant after the intervention. The results of statistical analysis obtained a P-value of 0.002 using the McNemar test. Hence, there was a difference in spiritual behavior that support the recovery of TB patients before and after the intervention, and the collaborative model affects spiritual behavior.

The effects of the collaborative model on the recovery of TB patients. The effects of the collaborative model on patient cure rates compared the percentage before and after the intervention, which was 73 and 90%, respectively.

Discussion

Eating behaviors that support the recovery of TB patients. Tuberculosis (TB) is a respiratory infection caused by Mycobacterium tuberculosis (17) and is treated with antibiotics. However, treatment without the necessary nutritional intake can make this disease difficult to cure (18,19). Therefore, TB patients need to fulfill their nutritional intake by consuming diets that accelerate their recovery (20).

The intervention used a collaborative model involving nutrition officers, responsible for educating TB patients and their families about the right diet to support their recovery. The intervention started with the initial treatment, anticipating that the patients will consume nutritious foods in addition to taking the medication regularly, to support their recovery. Furthermore, the patient's family was also involved in this intervention because it will be beneficial for the officers to always control and prepare nutritious food for the patients at home.

The results showed that eating behavior that supports the recovery of TB patients was influenced by the collaborative model between family support and health care workers. Additionally, the patients only focused on the treatment recommended by the officers at the public health center before the intervention. Many patients neglected their diet because there was no special counseling provided by the nutrition officers. However, after the intervention, TB patients and their families apply a healthy diet such as eating foods that contain carbohydrates, vegetables and animal proteins that boost energy and a maintain normal weight, vitamins to strengthen the immune system against infection, and avoiding greasy foods and alcoholic beverages.

The results were in line with the research by Chusna & Fauzi (21) which observed a historical association between vitamins A and D intake and tuberculosis cure. This finding also in line with Azizah (22), who found that nutritional status was associated with a long recovery time for TB patients.

Table I. Eating behaviors that support the recovery of TB patients before and after intervention.

Before	After		P-value
	Good	Poor	
Good	6	1	<0.001
Poor	18	5	

Table II. Clean living behaviors that support the recovery of TB patients before and after intervention.

Before	After		P-value
	Good	Poor	
Good	12	1	0.001
Poor	14	3	

Table III. Spiritual behaviors that support the recovery of TB patients before and after intervention.

Before	After		P-value
	Good	Poor	
Good	9	1	0.002
Poor	13	7	

Healthy living behaviors that support the recovery of TB patients. The recovery of patients with TB is influenced by regular treatment for 6-8 consecutive months, a healthy home condition such as adequate air circulation and sunlight, as well as healthy living behavior (23). Furthermore, the cooperation and concern of all parties, especially patients and their families are required for the programs prepared by the government to reduce and treat TB patients. A clean environment and healthy living behavior should be promoted and the principle of prevention is better than treatment must be instilled in the community.

The results showed that the collaborative model between family support and health care workers impacted on clean living behavior that supports the recovery. Before the intervention, TB patients and their families were unaware of the environment and treatment that could support their recovery, due to the lack of counseling by environmental health and health promotion officers. However, TB patients and their families implemented a healthy home environment after the intervention, by providing windows for each room to allow direct sunlight. Examples of healthy living behavior includes throwing out sputum in a specific place, wearing masks, keeping a social distance when communicating, doing regular light exercise, sunbathing in the morning, as well as separating cutlery and beds during treatment.

The results were in line with the research by Solihin & Alifah (20) which showed that throwing out/spitting sputum in the toilet, getting used to clean and healthy living behavior (PHBS), doing regular exercise, not smoking, closing the mouth and nose when coughing and sneezing, opening the window to get sunlight and fresh air, and drying bedding to avoid it getting damp, affect the recovery of pulmonary tuberculosis patients.

Spiritual behaviors that support the recovery of TB patients. Spiritual therapy is used to reduce anxiety levels and it is needed because actual, physical, and psychological disorders are caused by material-biological and spiritual factors, hence a disease must be cured based on the cause. Additionally, the therapy is performed by zikr/remembrance, repentance, placing trust in God, and praying to be cured (24).

The results showed that the collaborative model impacted the spiritual behavior that supports the recovery. Before the intervention, a few TB patients engaged in morning and evening zikr/remembrance, praying, and repenting, since they were unaware of the benefits of recovery due to the lack of spiritual counseling. However, after the intervention by specific officers selected by the head of the public health center with good religious knowledge, the number and intention of TB patients and their family performed these activities increased. These patients feel calm, their confidence appears, and it greatly affects faster recovery.

The results of this research were in line with Amrullah *et al* (25), reporting that psycho-spiritual effect on reducing anxiety levels in patients with Pulmonary Tuberculosis. This anxiety arises due to psychological problems the patients faced, such as stress, guilt, despair, and fear of death. Subsequently, Friska (2018) also confirmed that there was a relationship between stress coping and adherence to taking medication in TB patients.

The effects of the collaborative model on the recovery of TB patient. Collaboration is the process of facilitation and implementation involving multiple disciplines to solve problems that not are easily solved by only one. The successful treatment of TB patients is supported by the collaborative model between the role of the patient's family and health workers.

Furthermore, the results found that the model impacts on the cure rates of TB patients. Before the intervention, the patients focused on taking medication and neglected factors that support and inhibit their recovery. However, TB patients and their families adopted a healthy diet, living behavior, and increased spiritual levels after the intervention, hence the cure rate increased from 73 to 90%. In addition to age factors, this research also discovered that the patients whose recovery were inhibited had comorbid diseases, such as Diabetes mellitus (DM), heart disease, and hypertension.

These finding were in line with the research by Dhina Nurlita and Lintang Dian (26), which reported a relationship between comorbid diseases and the recovery status of TB patients. Additionally, Anita & Sari (27) stated that there is a relationship between Diabetes Mellitus (DM) and the recovery of TB patients.

Conclusions

The collaborative model influences eating, healthy living behavior, and spiritual behaviors that support the recovery and cure rate of TB patients. Subsequently, the government needs to develop policies to establish integrated counseling conducted by pulmonary tuberculosis, nutrition, environmental health, and health promotion officers for the patients and their families to ensure successful treatment.

Acknowledgments

Contributions

All authors contributed to design the study, drafting, review and editing; S, contributed to collect data; SM, MR, MB, contributed to analyze data. FO, supervise this study.

Ethical approval and consent to participate

This protocol received ethical approval from the ethics committee of the Faculty of Public Health, Hasanuddin University, Makassar with the code of ethics number 5543/UN4.14.1/TP. 01.02/2022.

Conflict of interest

The authors declare no potential conflict of interest.

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