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PULMONARY TUBERCULOSIS CONTROL MODEL WITH *SOCIAL MEDICINE* BY MEDICAL STUDENTS AND COMMUNITY LEADERS IN NORTH ACEH DISTRICT

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Abstract
Tuberculosis (TB) is still a health problem in the world, including in Indonesia which currently ranks second with the highest number of TB cases in the world. One of the provinces in Indonesia also has many TB cases in Aceh Province with the most cases found in North Aceh Regency. One of the obstacles to TB disease control in North Aceh is the non-compliance of TB patients in undergoing TB treatment. The government has established a drug monitoring program with a directly observed treatment service (DOTS) strategy, but this program has not succeeded in reducing the number of TB patients in North Aceh. Therefore, this study will apply to social medicine by involving the participation of community leaders and medical students so that patients comply with TB treatment. This research is qualitative research using the Participatory action research (PAR) method, the research stages using the Kurt Lewin plot. Actions carried out by community leaders are in the form of mentoring and providing support and motivation, while actions taken by medical students are monitoring and providing education to TB patients and their families. The results showed an increase in the adherence of TB patients to take drugs and an increase in the success of treatment in TB patients.
Keywords: Model, Control, Tuberculosis, Approach, Social Medicine, Medical Students, Community Leaders

INTRODUCTION

The number of patients with pulmonary TB in Aceh Province continues to increase every year. Based on data from the Aceh Provincial Health Office, the number of TB cases in 2018 was 8471 cases, and notified child cases were 240. This figure has increased compared to 2017 which was 7235 cases. The most TB cases were from North Aceh Regency, as many as 1247 cases with a *Case Detection Rate* (CDR) of 48 percent (Aceh Provincial Health Office, 2019). North Aceh district is the largest contributor to TB cases in Aceh Province with an incidence of 451 cases per 100,000 population and those undergoing treatment at health facilities are only 27 percent of the total incidence. The high number of TB cases in North Aceh Regency is because North Aceh is the area with the most population compared to the Regency/City in Aceh Province (North Aceh Health Office, 2018).

Various efforts have been made by the government to deal with the TB problem in Aceh, even control has been carried out since the Dutch colonial era. Currently, the government has established a drug monitoring program with a *directly observed treatment service* (DOTS) strategy, but this program has not run optimally, so there are still many TB patients who do not take their medication until they are finished. This happens because the treatment of pulmonary TB

must be carried out by the patient for a relatively long time, causing boredom for the patient to take the drug until it is finished.

Based on a preliminary survey conducted quantitatively in 2017 on 79 TB patients, researchers found that as many as 66.5 percent of pulmonary TB patients used *"self-administered therapy"* (SAT) where the treatment was carried out by patients without being supervised by anyone. This method of treatment often leads to treatment failure, the treatment period becomes longer, the costs required for treatment increase, and relapse cases increase due to initial treatment failure. In this survey, the researchers also found that the number of TB sufferers in males was 64 percent more than in females, as many as 42.4 percent of TB sufferers accompanied by comorbid diseases such as DM, and the researchers also found 1 TB patient with HIV positive.

In the 2017 survey, researchers also interviewed 5 TB officers from the Health Service and received information that the current control of pulmonary TB is only carried out by health workers and NGOs. Meanwhile, the family takes on the role of a drug monitoring program. Most of the drug monitoring programs are the wives of the sufferers because most cases of pulmonary TB are suffered by men. However, many pulmonary TB patients do not comply with drug monitoring program orders because they feel controlled by their wives.

In a survey conducted by researchers in 2018 on 76 patients with pulmonary TB at the Cut Mutia General Hospital, it was found that 43 patients or 56.6 percent of them did not have a drug monitoring program, 47 patients or 61.8 percent did not comply with taking medication and 45.2 percent of them He suffers from comorbid diseases, dominated by diabetes mellitus and hypercholesterolemia. In 2019 the researchers also conducted a qualitative survey by interviewing 12 TB program management officers at 3 Puskesmas in North Aceh Regency. It was found that the success of TB treatment is not only on medication adherence but is also influenced by the patient's nutritional condition, comorbidities, knowledge about TB, and family support. According to the officer, most of the pulmonary TB sufferers in their work area are poor people with poor nutritional conditions.

Due to the low success rate of pulmonary TB treatment in Aceh, researchers are trying to design a treatment assistance model that will be able to change the behavior patterns of pulmonary TB patients in undergoing treatment so that they can adhere to treatment until it is completed and declared cured. Researchers try to add several elements that can play a role in the success of pulmonary TB treatment in Aceh, namely the incorporation of the roles of medical students and community leaders, in addition to the roles of health workers and NGOs that have existed before.

LITERATURE REVIEW

Pulmonary tuberculosis is a disease caused by *Mycobacterium tuberculosis*. These germs have a high-fat content in their cell membranes, causing these bacteria to become resistant to acids and the growth of these germs takes place very slowly. Robert Koch (1882) stated that these bacteria are not resistant to ultraviolet rays, therefore transmission mainly occurs at night (Danusantoso, 2014). People who have been infected with tuberculosis can show a variety of symptoms on their bodies or they can be without any symptoms. Generally, the symptoms that sufferers often complain about are coughing up phlegm for up to 3 weeks continuously which is sometimes accompanied by phlegm containing blood. In addition, patients can also experience shortness of breath, chest pain, weak body condition, no appetite and end up with decreased body weight (Savithri, 2011).

At the beginning of the infection, the cough symptom experienced by the patient is only a dry cough due to irritation of the bronchi, but at a later stage, inflammation will occur, resulting in a

cough with phlegm which can sometimes contain due to ruptured blood vessels (Collu et al. 2018). Other symptoms that can be felt by patients can be in the form of a fever that is not too high (sub febrile) or it can even be a fever with an increase in body temperature up to 40-41°C (Shanmuganathan & Subramaniam, 2015). The condition of the patient's immune system will greatly determine the severity of the symptoms that appear. Generally, the symptoms of shortness of breath will appear when the infection is advanced and has affected part of the lung organs. If the damage to the lung organs has reached the wrapping of the lungs or has damaged the pleura, pleurisy will occur, causing complaints of chest pain. Another symptom that sufferers sometimes complain about is sweating (Agyeman & Ofori-asensio, 2017).

Tuberculosis transmission comes from TB patients with positive Acid-Resistant Bacilli (BTA) examination results who cough or sneeze, which causes phlegm *(droplet nuclei)* to spread into the air (Pangestika, Fadli, & Alnur, 2019). Bad behavior of TB sufferers such as throwing phlegm carelessly, and not covering the mouth when coughing or sneezing allows the transmission to other people around them, especially people who live in the same house as the sufferer. In addition, the physical condition of the home environment that does not meet health requirements will further increase the risk of transmission (Yigibalom, Sulistiyani, & Nurjazuli, 2019).

According to the Ministry of Health (2019), currently, Indonesia is an endemic area for tuberculosis, not only pulmonary tuberculosis but also extrapulmonary tuberculosis. Indonesia's burden in dealing with pulmonary tuberculosis is also exacerbated by the increasing findings of cases of pulmonary tuberculosis that are resistant to treatment due to incomplete treatment of previous tuberculosis (Asri, 2014).

According to Wang, 2020; Roy, 2015; Hailemeskel, 2017, dropping out of medication or not completing treatment experienced by patients can be caused by many factors, including psychological factors, distance from home to health services, side effects of drugs, feeling better, not knowing the risks when stopping treatment, smoking habits, history of TB treatment, area of radiological lesions, gender, alcohol consumption, age, number of smear bacteria at the beginning of the examination, marital status, income, education level, comorbidities (diabetes mellitus, hepatitis, lung tumor, etc.), source of treatment costs, the type of treatment used, and the drug monitoring program. Therefore, good communication between health workers and patients is an important factor that determines the success of treatment. TB patients' disobedience in taking the medication regularly remains an obstacle to achieving high cure rates. The high rate of drug withdrawal will result in high cases of bacterial resistance to anti-tuberculosis drugs (OAT) which require greater costs and duration of treatment.

Tuberculosis is a medical disease that is closely related to social conditions. This disease can provide a barometer of social welfare (Khan, Islam & Ferdous, 2019). Social factors include poor quality of life, poor housing, overcrowding, population explosion, malnutrition, smoking, alcohol abuse, lack of education, extended family, early marriage, and lack of awareness about the causes and transmission of TB. These factors are interrelated and contribute to the occurrence of tuberculosis and its transmission (Pierrot et al., 2018).

Therefore, TB control must pay attention to the medical and social factors of the sufferer. *Social medicine* is an interdisciplinary branch of medical science that studies the health of populations and health care systems within a broader social context. Social medicine contributes to understanding the determinants of health and how best to improve population health. Social medicine as a part of public health is oriented toward the health problems of population groups, their characteristics, and determinants, and the possibility of their control. The scientific and

methodological basis of social medicine is mainly epidemiology, biostatistics, social psychology, sociology, law, economics, managerial science, philosophy, and history (Kostikova, 2015).
Within the scope of *social medicine*, the social environment is as important as the physical and biological environment for health and disease. *Social medicine* aims to study humans as social beings concerning the total environment (social and physical); pay particular attention to socio-economic forces that directly or indirectly affect the health of individuals and populations (Porter & Guerin, 2006).

METHODOLOGY

This type of research is qualitative. The stages of research are carried out qualitatively to collect facts that occur in the community as a basis for obtaining a reality in society. The research method uses *Participatory Action Research (PAR)* PAR is an action of a social group to carry out scientific study actions to direct, improve, and evaluate their actions repeatedly by involving all parties in the group to participate in their actions. The position of researchers in the PAR approach is not only to examine and examine an outcome that occurs in the community but researchers are also involved in participating and mingling with the community as facilitators who bridge the implementation of an activity. The data was obtained by conducting deep interviews by triangulation of 3 data sources, namely health workers, community leaders, and TB patients.
Researchers engage with pulmonary TB patients and their families to identify potential problems, causes, and possible interventions. And the researchers also made contact with community leaders in taking a role in increasing the success of pulmonary TB treatment. This research will empower community leaders and medical students to play a role in the treatment of pulmonary TB patients. The stages of research using Kurt Lewin's plot are planning, action, observation, and reflection. Data analysis was carried out using the qualitative analysis software Atlas. ti 8.

RESULTS AND DISCUSSION

Tuberculosis Control with Social Medicine Approach by Community Leaders and Medical Students

Phase 1. Planning

The planning phase as the initial stage of this research began with meeting with data source participants for in-depth interviews. Researchers interacted with participants starting by introducing themselves and building an informal atmosphere so that participants felt a comfortable atmosphere and there was no pressure. Participants felt comfortable with the presence of the researcher and were willing to provide information about tuberculosis control very openly.
Based on the information collected, there are four themes related to tuberculosis control with a social medicine approach. The themes are as shown in table 1.

Table 1. ***Matrix of Tuberculosis Control Themes in North Aceh Regency***

No	Theme	
1.	Theme 1: The number of TB cases is increasing	
	Sub-theme	Category
	1) Case finding	a) Patients come from outside the north Aceh area b) Active case search/contact investigation c) Check family contacts closely carried out by officers.

	2) Patients who do not comply with repeated treatment	a) Patients who do not finish taking treatment again b) Patients who stop taking medication, return for treatment because their complaints reappear
2.	Theme 2: Impact of TB disease	
	Sub-theme	Category
	1) Psychological impact	a) Embarrassed if the disease is known to others b) Fear of being shunned by neighbors c) Feeling healed, even though Treatment is not finished d) Feeling bored, because it takes too long to take medicine e) Feeling useless because of old age f) Family doesn't care/any family support
	2) Side effects of the medicine	a) Nausea after taking medicine b) No appetite c) Discomfort in stomach d) Body feels weak
3.	Theme 3: Treatment support for TB sufferers	
	Sub-theme	Category
	1) Health worker support	a) Delivering medicine to the patient's home b) Contacting via telephone c) Medicine was given for one month
	2) Family support	a) Family reminding to take medicine b) Family members taking patients for control to the Puskesmas
	3) Social support community leaders	a) Involving TB sufferers in the structure village apparatus b) Lend a vehicle village-owned motorized vehicles for TB sufferers when seeking treatment at the Puskesmas Health
	4) service support Health	a) services at the puskesmas both b) Free/free treatment c) Patients using BPJS
	5) Empowerment of community leaders	a) Village heads have power b) Availability of village funds that can be budgeted for health c) Village heads are closer to the community d) Village head willing to help e) Village head willing to provide assistance
	6) Empowerment of medical students	a) Educational institutions can be involved in TB control b) students clinical year already know tuberculosis c) Some medical students can help the community d) When boarding school students can be close to the community
4.	Theme 4: Barriers to TB treatment	
	Sub-theme	Category

	1) Low patient knowledge	a) Lack of education from officers due to the limited number of TB program officers b) Providing less than optimal c) education level of patient education Low d) TB patients with old age e) Forgetting after being given e The
	2) distance of residence is far	a) There is no vehicle to take medicine b) to the health center, the child must wait to be delivered by the child, if the child has time
	3) The patient is malnourished	a) Patients with low socio-economic conditions b) There is no solution to the problem of malnutrition in TB patients
	4) drug monitoring program	c) Does not have a drug monitoring program d) drug monitoring program do not perform their duties optimally e) TB patients do not comply with a drug monitoring program
	5) Comorbid diseases	a) Uncontrolled blood sugar levels b) Suffer from DM before TB infection c) Patients with a family history of DM

Phase 1. Action

Action activities to control tuberculosis were carried out on 30 patients with pulmonary TB using the same method for all patients with pulmonary TB. The Actions taken include the following:

1. Community leaders, in this case, the village head, provide support while TB sufferers are undergoing treatment. The support is in the form of motivation for patients to comply with treatment. The village head will also provide the means of transportation needed by patients for re-control and taking medicines to the puskesmas.
2. The village head will meet the nutritional needs of TB sufferers in the form of milk supply which will be prepared by posyandu cadres.
3. Medical students came to the participant's house at the time and agreed with the TB patient. A visit or *home visit* will be conducted once a week.
4. During *a home visit*, medical students will take anamnesis regarding the complaints felt by the patient, perform a physical examination and check blood sugar levels. Students will also monitor the condition of patients with PHBS and provide education.

The explanation given by the researcher was well received by the participants. This can be seen from the participants' willingness to accept researchers into their homes and make an agreement on a time to meet.

Phase 3 observation

Observation of participants is carried out through monitoring the implementation of activities. Observations are in line with mentoring activities carried out by community leaders and medical students. Observations include agreement on actions, implementation constraints, and positive values of actions.

Phase 4 reflection

Control of pulmonary tuberculosis with *social medicine* carried out by community leaders and medical students has provided benefits for people with pulmonary TB. Acceptance of pulmonary TB patients for assistance from outside parties other than their own families is an *entry point* to improve treatment adherence and prevent disease transmission to other family members. The assistance provided by community leaders has greatly helped TB sufferers in undergoing treatment, such as the availability of vehicles as a means of transportation that patients can use to take drugs to the Puskesmas. So that the availability of medicine at the patient's home is not interrupted and the schedule for re-control can be carried out according to the schedule determined by the Puskesmas. In addition, the village head also provides solutions regarding the fulfillment of the economic needs of TB sufferers in the form of involving TB patients in the village apparatus structure, so that TB sufferers get wages to meet their daily needs. Another benefit is an increase in the motivation to suffer to recover from the disease. In addition, the level of adherence to taking medication is very high so it affects the patient's recovery rate.

Empowerment of community leaders and medical students in controlling pulmonary tuberculosis with a *social medicine* can be implemented based on four themes, namely (1) the number of TB cases is increasing, (2) the impact of TB disease, (3) treatment support for TB patients, (4) barriers in TB treatment. The four themes that are the determinants of tuberculosis control are synergies between internal factors found in TB patients, and external factors originating from the patient's environment and available health services. Tuberculosis control is all health efforts that prioritize promotive and preventive aspects, without neglecting curative and rehabilitative aspects aimed at protecting public health, reducing morbidity, disability, or death, deciding transmission, preventing drug resistance, and reducing the negative impacts caused by tuberculosis. TB control is carried out in an integrated, comprehensive, and sustainable manner by involving all relevant parties, both the government, the private sector, and the community.

Based on the national strategy for TB control, there are six reinforcements needed, namely: (1) strengthening the leadership of the TB program; (2) increasing access to quality TB services; (3) control of TB risk factors; (4) enhancement of TB partnerships; (5) increasing community independence in TB control; and (6) strengthening TB program management (Kemenkes RI, 2017). This study strengthens the community's independence in TB control and strengthens TB partnerships.

Strengthening community independence in TB control is carried out by empowering community leaders, namely local village heads. Strengthening TB partnerships is carried out by empowering medical students who are at the professional stage, thereby forming new partners in TB control from educational institutions. These two reinforcements also indirectly affect the national strategy in terms of strengthening the control of risk factors. This happens because *actions* taken by community leaders and medical students are in the form of providing assistance to patients, monitoring treatment, and providing education which also includes efforts to control risk factors in TB patients.

Control of TB risk factors is aimed at preventing, and reducing the transmission and incidence of TB disease. Control of TB risk factors is carried out by cultivating clean and healthy living behavior, cultivating ethical coughing behavior, maintaining and improving the quality of housing and its environment by healthy home standards, increasing body resistance, handling TB comorbidities, and implementing TB infection prevention and control. in Health Care Facilities, and outside Health Care Facilities.

Tuberculosis control by empowering community leaders and medical students in this study uses *social medicine*. As it is known that tuberculosis is an infectious disease that is closely related

to the social conditions of the sufferer. According to Porter and Guerin (2006), within the scope of *social medicine*, the social environment is as important as the physical and biological environment for health and disease. This environment is unique to humans and includes cultural values, customs, habits, beliefs, attitudes, morals, religion, education, income, employment, living standards, community life, and social and political organization. *Social medicine* aims to study humans as social beings about the total environment (social and physical); pay particular attention to socio-economic forces that directly or indirectly affect the health of individuals and populations.

The pulmonary tuberculosis control model involves the role of community leaders to start tuberculosis control from a smaller scope, namely within the village scope. The role of community leaders can provide continuous assistance because they are closer and live with the community. Community leaders are still role models for the community so that what is conveyed by community leaders will be heard and obeyed. So that assistance for TB sufferers will be maximized.

The TB control model involving medical students is an initial step to utilizing the knowledge and skills possessed by students while they are in the professional stage of education. The use of students as companions for TB patients is considered very strategic because medical students already have sufficient knowledge about TB and the role of students in society is easy to accept. In addition, mentoring by students for TB patients can be continuous because every student pursuing medical professional education is required to make a home visit to the patient's home.

The model of involving community leaders and medical students in this study is a model of active participation in controlling tuberculosis. Community leaders and medical students are actively involved in assisting tuberculosis sufferers. The use of the role of community leaders and medical students in controlling pulmonary tuberculosis forms a structured pattern and interrelationships between the agents involved. The structure formed serves to assist TB patients so that they adhere to treatment until it is finished.

The feasibility of the model can be met based on the aspects *of transferability, dependability, credibility, and confirmability*. Aspect *transferability of* this model
relates to the existence of clear procedures or steps in the implementation of empowering community leaders and medical students, starting with a qualitative exploration of the problems of TB sufferers which resulted in the themes of the increasing number of TB cases, the impact of TB disease, treatment support for TB sufferers, obstacles in TB treatment followed by *action* on patients to test the suitability of the theme with the methods used starting from identifying problems with TB sufferers, analyzing problem-solving, planning solutions, agreements with community leaders and medical students, implementing agreements, monitoring and evaluating activities.

Aspects of *dependability* regarding the research implementation process are carried out step by step. Starting from meeting and determining participants, collecting data on TB control problems from various data sources, and analyzing data on problems with TB patients before and after taking *action*. The results show that several problems can be overcome, treatment adherence increases, as well as better patient behavior after *the action* is carried out, until the conclusion that the empowerment of community leaders and medical students in TB control can be implemented. Aspect *dependability* is in line with the *confirmability aspect.*

The *credibility* of the model for empowering community leaders and medical students in TB control can be fulfilled by observing and being together with participants, and triangulation in collecting data. Researchers together with community leaders and medical students build relationships so that sufferers accept researchers and community leaders and medical students carry out mentoring, monitoring, and providing education. Triangulation of data on TB control

issues starting from interviews with health workers, village heads, and TB patients, combined with direct observation of the patient's condition by conducting *home visits* that have shown changes for the better, and documentation of the implementation of *actions*.

The existence of this model is an alternative solution to improve TB treatment adherence so that later it can increase the success of treatment. The application of this model to TB sufferers in North Aceh District, especially in Lhoksukon and Dewantara sub-districts can be accepted, felt, and recognized by TB sufferers and their families, and has positive things. TB sufferers and their families feel the participation of village heads and medical students in the ongoing TB treatment. Assistance and support from community leaders are felt to be very helpful for sufferers, as well as monitoring and education provided by medical students, are also felt to be very useful because they are carried out continuously until patients have finished their treatment.

CONCLUSION

TB control model with a *social medicine* with the empowerment of community leaders and medical students, based on four themes, namely the increasing number of TB cases, the impact of TB disease, treatment support for TB patients, and barriers to TB treatment. *Actions* taken by community leaders are mentoring and providing support and motivation, while *actions* taken by medical students are monitoring and providing education. Both of these players can be understood and accepted by TB sufferers. The application of this TB control model was able to identify the problems of TB patients so far and then assisted to resolve these problems. Alternative problem solving carried out by community leaders and medical students with a social medicine approach turned out to be able to improve treatment adherence and behavior of TB patients for the better after-*action* until the end of the TB treatment period the patient was undergoing.

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