

# The Role Of Drug-Drink Supervisor by Decreasing The Resitance of *Mycobacterium tuberculosis* Germs

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**Abstract**—*Tuberculosis* (TB) is an infectious disease caused by the bacterium *Mycobacterium tuberculosis*. In 2010 WHO Global Report, obtained Indonesian TB data, the total of all TB cases in 2009 were 294,731 cases. TB drug (OAT) is given in the form of a combination of several types namely Isoniazid, Rifampicin, Pyrazinamide & Streptomycin. The emergence of cases of resistance to anti-tuberculosis drugs, especially the occurrence of dual immunity (*Multi Drug Resistance* = MDR). Factors that cause MDR include patient compliance in drug administration, lack of role of PMO and the phenomenon of "*addition syndrome*". This study aims to determine the relationship between the role of supervisors taking medication (PMO) and the resistance of the bacteria *Mycobacterium tuberculosis* in the working area of the Bengkulu city health center. Population and sample of 34 TB patients undergoing treatment therapy in the Bengkulu City Health Center work area. Data were analyzed using the Chi-Square test. The results showed that there was a significant relationship between the role of the supervisor of taking medication (PMO) and the resistance of the bacteria *Mycobacterium tuberculosis* in the working area of the Bengkulu city health center ( $p = 0.03$  and  $OR = 6$ ). The study concluded that there was a relationship between the role of the supervisor taking medication (PMO) and the resistance of the bacterium *Mycobacterium tuberculosis* in the working area of the Bengkulu city health center and the risk of occurrence of 6x. Suggestions for increasing PMO knowledge through counseling and training and giving rewards.

**Keywords**—PMO, Resistance, *Mycobacterium Tuberculosis*

## I. INTRODUCTION

*Tuberculosis* (TB or TB) is an infectious disease caused by the bacterium *Mycobacterium tuberosa*. This bacterium is a very strong basil bacteria that takes a long time to treat it. These bacteria infect the lungs more often than other parts of the human body [1].

Nearly 10 years Indonesia ranks 3rd in the world in terms of the number of tuberculosis (TB) patients.

The WHO report in 2009, noted that Indonesia's ranking declined to fifth with the number of TB patients at 429 thousand people. Five countries with the largest number of incidents in 2009 were India, China, South Africa, Nigeria and Indonesia [2].

In 2010 WHO Global Report, obtained Indonesian TB data, the total of all TB cases in 2009 were 294,731 cases, of which 169,213 were new cases of positive smear TB, 108,616 were cases of negative smear TB, 11,215 were cases of Extra Pulmonary TB, 3,709 were cases of TB Kambuh, and 1,978 were cases of re-treatment outside relapse cases (retreatment, excl relapse).

Anti-TB drugs (OAT) are given in a combination of several types, namely isoniazid, rifampicin, pyrazinamide & Streptomycin, in sufficient amounts and the right dose for 6-8 months so that all germs can be killed. Intensive doses and advanced doses are swallowed in a single dose, preferably on an empty stomach. If the drug guidelines used are inadequate, TB germs will develop into immune bacteria, resulting in TB resistance [3]. The emergence of cases of resistance to anti-tuberculosis drugs, especially the occurrence of dual immunity (*Multi-Drug Resistant* = MDR) TB germs is increasingly serious. Based on the WHO report in 2007, estimated cases of MDR TB were 0.5 million cases. MDR cases are highest in India (131,000), China (112,000), Russia (43,000), South Africa (16,000) and Bangladesh (15,000). This MDR TB case is deadly, very infectious and difficult to cure. MDR TB case treatment is very complex where it takes a long time, high costs and strict supervision.

At the global level, Indonesia ranks 8th out of 27 countries with the most burden of *multi-drug resistant* (MDR) in the world with an estimated MDR TB patients in Indonesia at 6,900, which is 1.9% of new cases and 12% of cases of re-treatment. Estimated cases of MDR TB as many as 5,900 cases originating from pulmonary TB cases and 1,000 cases of pulmonary TB re-treatment [3].

Factors that cause MDR include patient compliance in drug administration. If irregular drug administration, for example, is only eaten two or three weeks ago stops, after two months of stopping then moving the doctor to get the

drug back for two or three months and then stop again, and so on and the phenomenon of "addition syndrome" that is a drug added in a treatment guide that doesn't work. If the failure occurs because the TB germs have been resistant to the first alloy, then the addition of one type of drug will only increase the length of the list of resistant drugs [1]. For Bengkulu Province, MDR cases have never been reported because they have never been tested for TB resistance to OAT in vitro because what is done routinely in hospital laboratories and Health Center is the microscopic examination of Acid Resistant Basil (BTA). Microscopic examination sometimes produces false negatives.

Treatment failure and lack of discipline for patients with pulmonary TB are strongly influenced by several factors. One of them is the role of PMO. PMO is very important to accompany patients to achieve optimal treatment outcomes [4]. Irregularity in taking medicine causes resistance problems. [5].

Based on the 2013 District / City Health Profile data in Bengkulu Province, there were 1,701 positive TB patients with the most sufferers in Rejang Lebong Regency, namely 29.9%, while Bengkulu City was in the 4th place at 7.5%. In the M. Yunus Regional Hospital, Bengkulu city, there were 170 TB cases in 2013 (Bengkulu Provincial Health Office, 2013). Based on data from Bengkulu City Health Office, the number of positive smear TB cases in 2013 found in the Sidomulyo Community Health Center was 127 patients, while in other health centers such as Sukamerindu Health Center positive 68 smear TB, 59 smear positive fish market health centers and 59 health centers Nusa Indah TB positive smear is 49 patients [6].

**II. METHODS**

This study was Type of research used was *quasi-experimental* using research design *Cross-Sectional* where the cause variables (*independent variables*) and consequences (*dependent variables*) that occurred in the object of research were measured or collected simultaneously or at the same time [7].

Variables of this study consisted of independent variables consisting of the role of supervisors taking medication (PMO) and the dependent variable that is the resistance of the bacteria *micro bacterium tuberculosis*

**III. RESULTS**

Table 1 Distribution of Respondent Characteristics by Age Group, Gender, and Level of Education in Pulmonary TB Patients in Bengkulu City Health Center Work Area (n = 34).

AGE GROUP	FREQUENCY	(%)
YOUTH	5	15
ADULT	29	85
TYPES	FREQUENCY	(%)
MALE	15	44
WOMEN	19	56
EDUCATION	FREQUENCY	(%)

SMP	11	32
SMA	18	53
PT	5	15

Table 1 shows the characteristics of respondents based on age group, which is 29 adults. people (85%). The highest gender is in women 19 people (56%), the highest level of education in high schools each of 18 people (53%).

Table 2 Distribution of Frequency of Role of Drug Drinking Supervisors (PMO) and Resistance of Mycobacterium Tuberculosis Germs Against Anti Tuberculosis Medication (OAT) in Bengkulu City Health Center Work Areas.

Variable	Frequency	Percentage
Role of PMO		
Less	11	32.4
Good	23	67.6
Total	34	100
Germ		
Resistant Resistance	15	44.1
No Resistance	19	55.9
Total	34	100

From table 2 it can be seen that most of the role of PMO is good that is equal to 67.6% and the resistance of the Mycobacterium Tuberculosis Germs against Anti Tuberculosis (OAT) drugs is as large as not resistant 55.9%.

Table 3 The Role of Drug Drinking Supervisors (PMO) with the Resistance of Mycobacterium Tuberculosis Germs Against Anti Tuberculosis Medication (OAT) in the Bengkulu City Health Center Work Area.

Variable Role of PMO	Resistance		No Resistance		P	OR
	f	%	f	%		
Less	8	72.7	3	27.3	0.030	6,095
Good	7	30.4	16	69.6		
Total	15	44.1	19	55.9		

From table 4.3 it can be seen that of the 23 respondents who were good PMO, 16 (69.9%) respondents were not resistant. From the test,  $p = 0.030 < \alpha (0.05)$  was obtained, meaning that there was a significant relationship between the Role of Drug Drinking Supervisors (PMO) and the Resistance of Mycobacterium Tuberculosis Germs Against Anti Tuberculosis (OAT) Medicines in the Bengkulu City Health Center Work Area. And obtained a value of OR 6.095 which means that the role of PMO is less risky six times the resistance of Mycobacterium Tuberculosis Germs Against Anti Tuberculosis Medication (OAT).

**IV. DISCUSSION**

**Respondent Characteristics**

The results of research conducted on respondents found that most of the age of TB patients in the Bengkulu City Health Center Work Area were patients aged 20-59

years. Research from Munirah *et al* (2013) also found the same thing that the highest respondent age was in adults, amounting to 13 people. So that the results showed that there was a relationship between the age of patients with the incidence of pulmonary TB (*P-value* = 0.004). Characteristics of respondents showed that the proportion of TB patients undergoing treatment at Tanggul Public Health Center were mostly 19 women (56%). This can be due to differences in the level of immunity, lifestyle and activities carried out, the level of knowledge and awareness of health services that affect the reporting rate of incidence of pulmonary tuberculosis as well as the existence of bad stigma in pulmonary TB patients that makes it reluctant to undergo treatment for the disease. Most patients undergoing pulmonary TB treatment in the Bengkulu City Health Center Work Area were 53% high school respectively.

### **The Role of PMO**

From the research conducted 67.6%, it was found that the role of PMO as this shows that the majority of PMO roles are good. The results of the research data show that as many as 23 PMO (67.6%) play a good role in their duties. This was indicated by the recognition of TB patients who said that the PMO always prepared and reminded patients when they were taking medication, motivated patients when they felt bored to take medication every day, reminded them of the time to take medication and sputum checks and tell patients what they should and should not do; such as removing sputum in the toilet or a place that is given a disinfectant and must close the mouth when coughing [1].

The role of PMO in treatment pulmonary TB patients are PMO behavior in the form of actions monitor drug consumption patterns, supervision of guarding behavior health and fulfillment of drug needs for pulmonary TB patients. The role of PMO shown by PMO in this study, among others, with PMO constantly monitoring patient compliance in taking drugs, reminding patients if the drug will run out, and willing to take patients to take pulmonary TB drugs to the Health Centre, The role of a good PMO is supported by several factors, among others, the relationship between PMO and patients and the proximity of PMO to patients. Distribution of PMO relationships with patients shows that most PMOs are patient families. This relationship causes the patient as a family member to get support and protection from the family towards meeting their health needs. PMO's support as a family member of the patient is a form of family instrument support, which provides practical help for the health and family health care fulfillment activities [6].

The relationship between patients and PMO, where the distribution of PMO residences with patients mostly lives at home with PMO, increases the role of PMO in the recovery of patients. This is as stated by Setiadi (2008), which states that one of the family's support for its members is instrumental support, namely the family is a practical and concrete help, including the health of sufferers in terms of eating and drinking needs, rest, avoidance of sufferers from use of fatigue.

In addition, there is still a role for PMO of less than 11 PMO (32.4%). This is because a busy PMO such as helping to earn a living or PMO is not from the patient's

family so that the patient does everything himself. PMO which is considered inappropriate in carrying out its role mostly only helps patients when taking drugs at the Health Centre alone [8]

The choice of PMO is prioritized by the patient's family because the family is the closest person who can monitor the patient at any time when taking medication without having to pay a fee for transportation. The existence of an inner bond between patients and PMOs from their families is also possible can improve the practice of the PMO. PMO who do not have family relationships with patients, 3 times greater have less performance compared to PMO who have a relationship family with patients [9].

Every TB patient who gets treatment must be accompanied by PMO to do direct observation (DOTS = *direct observed treatment short course*(WHO, 1999). The relationship between patients and PMO is family (husband, wife, child, son-in-law, father, mother, brother, sister, grandma or brother). Natalya & Anwar's (2013) study also mentions that patients who were not accompanied by PMO contained 54% adherent and 26% non-compliance (*drop out*) in the intensive phase, and in the advanced phase there were 50% obedient. This treatment failure is due to a lack of supervision from health workers and from families when patients take medication. Disobedience to treatment in the intensive phase because the patient feels bored and nauseous when taking medication and every day, there is also a reason that he felt healed.

### **The resistance of Mycobacterium Tuberculosis Germs Against Anti Tuberculosis Medication (OAT) in Bengkulu City Health Center Work Areas**

From the research conducted, frequency distribution of the resistance of Mycobacterium Tuberculosis Germs Against Anti Tuberculosis (OAT) Medicines in Bengkulu City Health Center was 19 patients (55.9%) not resistant. This shows that most of the bacteria Mycobacterium Tuberculosis is not resistant.

Pathways involved in the development and spread of MDR TB due to mutations of the tuberculosis mycobacterium gene. The bacillary mutation has become resistant to one type of drug due to obtaining certain inadequate OAT therapy. Inadequate therapy can be caused by consumption of only one type of drug (direct monotherapy) or consumption of combination drugs but only one is sensitive to these results (indirect monotherapy). TB patients with secondary drug resistance can infect others where the infected person is said to be primary resistance. Limited drug resistance was seen at BTA examination and not followed by PCR examination. Transmission is facilitated by the presence of HIV infection, where disease progression is faster, there is an inadequate infection control procedure; and delays in diagnostic enforcement (Leitch,2000).

There are several causes of OAT resistance, namely [1]. Use of a single drug in the treatment of tuberculosis. of inadequate drug combinations, namely the type of drug that is lacking or in the environment there has been resistance to the drug used, for example giving rifampicin and INH alone in areas with resistance to both drugs.

Irregular drug administration, for example, only lasted two or three weeks stopped, after two months of stopping then the doctor got the drug back for two or three months and then stopped again, and so on.

The addition syndrome phenomenon is a drug added in an unsuccessful treatment mixture. If the failure occurs because the TB germs have been resistant to the first alloy, then the addition of one type of drug will only add to the length of the list of resistant drugs. The use of combination drugs that do not mix well is disrupting the bioavailability of the drug. Provision of drugs that are not regular, sometimes stopping delivery for months. Relationship The Role of Drug Drinking Supervisors (PMO) with the Resistance of Mycobacterium Tuberculosis Germs Against Anti Tuberculosis (OAT) Medicines in the Bengkulu City Health Center Work Areas.

The results of the cross tabulation of the Pare *et al.* (2012) show that there is a meaningful relationship (OR = 3.636 with 95% CI 1,225-10,790) between PMO role variable with pulmonary TB patient behavior. This means that pulmonary TB patients have a role PMOs that are less risky 3,636 times, not regular treatment compared to patients with pulmonary TB who has a good PMO role. This research is supported by research Sumarman and Krisnawati (2012) found that the role of PMO who is not good risks as much 3,013 times to cause patients to disobey double-check phlegm in the final phase of treatment compared with patients who have the role of PMO the good one. The same thing was found by Sumange (2010) found that there was a relationship between roles PMO with compliance with treatment for pulmonary TB patients. Social support by PMO in the form of emotional support increases motivation for pulmonary TB patients to recover.

Since 1995 the Indonesian government has launched a program to eradicate pulmonary tuberculosis using the DOTS (Directly Observed Treatment Shortcourse) strategy, which is a direct supervision of short-term treatment. Supervisor swallowing drugs is a person who functions to supervise, provide encouragement and ensure that TB patients swallow anti-TB drugs regularly. As a PMO, it must be from someone who is known and trusted from the patient, family and health workers who are willing to help supervise the patient during treatment, because the job of PMO is to supervise and give encouragement to TB patients to be more compliant in treatment and check into health services. to complete. The better the role of PMO, the higher the success of pulmonary TB treatment. In general, research shows that the better the role of PMO, the higher the success of pulmonary TB treatment.

However, in the distribution of the relationship between the role of PMO and the Resistance of the Mycobacterium Tuberculosis Germs Against Anti Tuberculosis (OAT) drugs, there were 7 respondents who got the role of PMO well but there was germ resistance. This condition is caused by other factors that influence the success of TB treatment. The results of the interview with several respondents showed that respondents no longer had strong motivation to recover so that the willingness of these patients to undergo pulmonary TB treatment was reduced even though they received high support from the PMO. In addition, the possibility of germs is resistant bacteria even though the patient has never been exposed to OAT before.

The results showed that there was an influence of the role of PMO with the Resistance of the Mycobacterium Tuberculosis Germs Against Anti Tuberculosis (OAT) Medication, where the better the role of PMO, the resistant of germs did not occur. The results of this study are in line with Amilya's research (2009), about the effectiveness of the role of PMO from families and non-families with the recovery of pulmonary tuberculosis patients in the BP4 unit of Yogyakarta City. This study shows that there is no difference in the effectiveness of the role of PMO from families and non-families with the recovery of pulmonary TB patients in the BP4 Minggiran unit in Yogyakarta city in 2009. The better the role PMO then success treatment is increasing and otherwise, if the role gets worse PMO then success treatment is getting smaller.

According to Tirtana (2011), regularity of treatment has a strong effect on treatment success. Pulmonary TB patients monitored well by PMO have a chance to recover four times greater than those not monitored properly by PMO. Statistically, there is a strong and meaningful relationship between PMO performance and recovery of pulmonary TB in new cases of DOTS strategy, patients who have good PMO performance have the possibility to seek treatment regularly. This condition can be due to the awareness and strong motivation of the patient to be cured so that the presence of PMO or not does not affect the patient's intention to continue treatment regularly. In theory, this is explained in the theory *Health Belief Model* (HBM) developed by Rosenstock. HBM theory explains the reason someone obeys to do medication regularly, while others don't. The four beliefs identified in HBM theory are (1) beliefs about susceptibility to illness, (2) beliefs about the seriousness or malignancy of the disease, (3) beliefs about possible costs, and (4) beliefs about the effectiveness of actions in relation to alternative actions. The key to health actions that must exist is internal factors (symptoms of disease) and internal factors (interpersonal interaction, mass communication) (Sudarma, 2008). Findings of the PMO obtained from this research is very information valuable or is feedback for officers health that can be used to plan and implement a promotion or education program health of pulmonary tuberculosis patients. Troubleshooting Community health, namely non-compliance with treatment of pulmonary TB patients need to be planned properly, how health education programs are given and what is needed by the patient. In addition, it is necessary to think about the most appropriate and most appropriate method with the local community [4]. Health workers who are part of Community health centers are health teams consisting of general practitioners, community nurses, midwives, and other health workers.

Health workers always trying to make families and communities more empowered in the health sector. Besides that, the officer health motivates, facilitates, and explores active community participation in the health sector [11]. Health education in the framework of promotion health related to medication compliance pulmonary tuberculosis patients. People are encouraged to come to health services if they feel that there are symptoms of pulmonary tuberculosis such as signs and symptoms that have been informed [10]. Information and health insights about pulmonary tuberculosis are given at every opportunity where the

community gathers. In addition, it was informed in pulmonary tuberculosis patients and their families, if at any time anyone wanted to ask about TBC health workers were willing to help. If the community has known that the patient or family can at any time come to the health worker in the neighborhood to get information especially about pulmonary tuberculosis, it means that the community can be empowered [11].

Health workers working with health cadres act as facilitators to *support groups* in the target community groups [11]. Health workers regularly and alternately visit groups of pulmonary tuberculosis communities, from one group to another. The purpose of this activity is to provide support to support groups or *support group of* pulmonary tuberculosis. Health worker support is given in addition to pulmonary TB patients, the patient's family also supports health cadres. Health cadres can act as facilitators, in addition to the task of finding and supervising pulmonary TB patients in treatment programs, health cadres can help health workers provide information about pulmonary tuberculosis [12]. Health cadres get information about pulmonary tuberculosis by attending training held and provided by health workers.

Addition to information about pulmonary tuberculosis is also taught how to empower communities or patients and his family. Health worker before giving training for health cadres, of course getting training. Training material other than regarding pulmonary tuberculosis is also given material about how do health workers work in empowering the community [13]. The community group consists of patients and his family, each member of the group can help health cadres play a role supervisor of pulmonary tuberculosis patients in the program treatment, supervise and remind each other. In addition, each group member can search and find pulmonary tuberculosis patients who are in their community environment. So that each group member has joint responsibility and commitment to achieve the degree of health and well-being of individuals, families, and various community groups in it. Beginning with a collective agreement about the community's desire for health. This is agreed upon by the community and the health personnel that are in it. [14].

## V. CONCLUSION

The role of PMO in pulmonary tuberculosis patients in the Bengkulu City Health Center work area is largely 67.6%. Resistance of Mycobacterium Tuberculosis Germs in Bengkulu City Health Center Work Area is largely resistant 55.9%.

There is a significant relationship between the Role of Drug Drinking Supervisors (PMO) and the Resistance of Mycobacterium Tuberculosis Germs in the Bengkulu City Health Center Work Area ( $p = 0.030$ ) with a value of OR 6.095 which means that the role of PMO is less risky 6 times the Germ Resistance of Mycobacterium Tuberculosis.

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