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FACTORS AFFECTING MEDICATION COMPLIANCE IN PEOPLE WITH PULMONARY TUBERCULOSIS: A STUDY BASED IN SITUBONDO; RURAL INDONESIA.

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ABSTRACT

Tuberculosis (TB), is a serious contagious disease which remains an urgent health problem in the world. Like the common cold, pulmonary TB is spread via the airborne route via coughing, sneezing, spitting or even talking, results in the dispersal of live tubercle bacilli, into the air. Situbondo is a district in East Java-Indonesia where the dropout rate from TB medication programme is particularly high. This research aimed to identify the relationships between public characteristics, side effects of drugs, transportation, distance of the community health centre, and support of a designated person or 'treatment observer' and the dropout rate. The study uses a case control study design. The sample size was 72 consisting of 18 cases and 54 controls. Samples were selected by proportional stratified random sampling technique. Odds ratio value analyses were used to find the risk factors, and the logistic regression were used to identify the significance of the variables in relation to the drop out with $\alpha = 0.05$. Statistically significant correlation were found as follows; education ($p=0.002$), knowledge ($p=0.001$), income ($p=0.013$) work ($p=0.002$) and, side effect of drugs ($p=0.003$), transportation ($p=0.001$) and support of the 'treatment observer' ($p=0.001$) to the drop out of patients with pulmonary TB. Based on these results, it was concluded that the drop out of patients with pulmonary TB is influenced not only by the internal factors namely patients' characteristics, but also external factors during medication. Changes to health services targeted at this patient population are suggested to increase overall compliance.

Keywords: Pulmonary TB, Drop Out, Non-compliance correlation, Indonesia public health

INTRODUCTION

Tuberculosis (TB) is a communicable disease and Mycobacterium tuberculosis is the causative agent. The main organs that are frequently affected are the lungs but it is also possible to infect other organs such as skin, lymphoid tissue and bones (Depkes, 2007). The majority of deaths occur in people of economically productive group, ages increasing the impact on families and societies. A recent report from the World Health Organization [WHO] cited by Indonesia Health Minister in Investor Daily (2010) shows that Indonesia TB prevalence ranked fifth worst from twenty two countries, after India, China, South Africa and Nigeria.

Indonesia used a WHO strategy to reduce patient's desire to stop treatment named 'Directly Observed Treatment Short-course' (DOTS), which relies on a person close to the patient who observes the medication and attempts to motivate patients. The short-term goals of the DOTS strategy is to ensure that the patients take medicines regularly until completion of the prescribed course with a key role for the observer, and the long-term, patients will be free of disease, reduced TB-related mortality, minimizing the incidence of relapse and associated antibiotics resistance and also to break the cycle of transmission with subsequent reduction in morbidity. Long term medication is required to effectively treat TB, lasting usually between 6-8 months, often leaves patients frustrated and impatient for the completion of treatment which contributes to patient to dropout from the treatment regimen. MDR (Multi Drug

Resistance) and XDR (Extensively DrugsResistance) strains emerges as result of incomplete medication and these are particularly troublesome in relation to possible pandemics (CNN, 2008). The DOTS strategy had a target of 85% patients being TB free and dropout rate of below 5% (Depkes, 2007; Date, 2005). Many factors may affect drop out, some of them are age, gender, education, income, employment, transportation, and distance of the health centre (Syaf, 2007).

Health care and its various programmes are delivered by the Indonesian National Health Office through a series of District Health Offices covering geographically determined regions. Each District Health Office discharges its responsibilities through Community Health Centres. Situbondo is a district in East Java which has a high prevalence of TB and has not yet achieved below 5% drop out from its TB programme. The District Health Office in Situbondo has 17 Community Health Centres. Based on annual data on pulmonary tuberculosis disease between 2007-2009, mean of dropout rate is 6%. The dropout rate in Situbondo is not spread evenly for each sub district, but is clustered in certain regions, namely Panarukan Community Health Centre (20%) and Arjasa Community Health Centre (19%).

Based on these disturbing data this study aimed to identify factors that influence the drop out from TB medication specifically in Panarukan and Arjasa districts of Situbondo.

METHODS

This study is a case-control design (case control study) taking a retrospective approach. It took place in Situbondo using Arjasa Community Health Centre and Panarukan Community Health Centre and focused on 2009 medical records of TB patients.

This research uses 1:3 as ratio of cases:control, then after calculation the ratio equals to 18:54. The 18:54 ratio means that all 18 patients with TB will be used in this research and control group consisted of 76 patients needed to be randomized to meet the quota as 54 patients. The population are patients with pulmonary TB smear-positive who were treated at Arjasa Community Health Centre and Panarukan Community Health Centre, n=94. The population was divided into two group, first group is "cases group" consisted of 18 patients who dropped out from TB medication, and the rest population (76 patients) had completed the medication, included in group as control. Selection of control is using Proportional Random sampling by region of Community Health Centre.

Independent variables are age, gender, income, education, knowledge level regarding the side effects of antibiotics, occupation, ease of transportation, distance to health centres, and support from observer (Pengawas Minum Obat /PMO in Indonesian). While the dependent variable is dropout-(Patients not attending the Health Centre regularly and not taking medication for a minimum of two consecutive mounths) and completed status of patients. Data were collected through closed interviews, documentation of Community Health Centre data and using Garmin eTrex Vista HCx GPS to measure distances of the health centre from the patient's house. Bivariate analysis was used for the calculation of Odds Ratio (OR) and Simple Logistic Regression for each of the variables to determine the risk of dropout events with CI=95%.

FINDINGS

Table 1. *The Distribution of education level, knowledge level, income, occupation, side effects of drugs, transportation, support by PMO of Respondent and correlation with drop out*

Variable	Cases n (%)	Control n (%)	Total N(%)	Analysis	
Education level					
Low (no education (0 years) until junior high school (7-9 years)	16 (88.9)	26 (48.1)	42 (58.3)	OR = 8.62 (CI 95% 1.64-60.24)	$p = 0.002$

Table 1 (continued)

Middle and above (senior high school and above >10 years)	2 (11.1)	28 (51.9)	30 (29.2)		
Total	18 (100)	54 (100)	72 (100)		
Knowledge level					
Low (score below ≤ 7.5)	17 (94.4)	18 (33.3)	35 (48.6)	OR = 34.0 (CI 95% 4.13 -740.27)	$p = 0.001$
High (score above 7.5)	1 (5.6)	36 (66.7)	37 (51.4)		
Total	18 (100)	54 (100)	72 (100)		
Income					
Deficit (income < outcome)	15 (83.3)	27 (50)	42 (58.3)	OR = 5.0 (CI 95% 1.16 -24.72)	$p= 0.013$
Surplus (income ≥ outcome	3 (16.7)	27 (50)	30 (41.7)		
Total	18 (100)	54 (100)	72 (100)		
Occupation					
Employed	17 (94.4)	29 (53.7)	46 (63.9)	OR = 14.66	$p = 0.002$
Unemployed	1 (5.6)	25 (46.3)	26 (36.1)	(CI 95% 1.81 -316.18)	
Side effect of drugs					
Severe side effects	12 (66.7)	11 (20.4)	23 (31.9)	OR = 4.36	$p = 0.003$
Mild side effects	5 (27.8)	39 (72.2)	44 (61.1)	OR= 0.51	
No side effects	1 (5.6)	4 (7.4)	5 (6.9)	Reference	
Total	18 (100)	54 (100)	72 (100)		
Transportation					
Hard (do not own vehicle and hard to get public transportation)	9 (50)	6 (11.1)	15 (20.8)	OR = 15.0	$p =0.001$
Medium (do not own vehicle but easy to	6 (33.3)	18 (33.3)	24 (33.3)	OR = 3.33	

There is a correlation between education ($p=0.002$), knowledge ($p=0.001$), income ($p=0.013$) occupation ($p=0.002$) and, side effect of drugs ($p=0.003$), transportation ($p=0.001$) and support by PMO ($p=0.001$) to the drop out of patients with pulmonary TB. The value of risk (OR or Odds Ratio) is used in preference to the P value as this provided clearer messages likely to command most attention from stakeholders in the recommendations. From this research we found that the biggest risk is knowledge level (OR=34) followed by support by PMO (OR=19).

DISCUSSION

Internal factors affecting Dropout

Education was significantly associated ($p=0.002$) in its effect on the drop out of pulmonary TB patients. The odds ratio of 8.62 means that the risk of dropout events in patients with pulmonary tuberculosis at a low level of education is 8.62 times greater than the individuals with higher education level (senior high school and above >10 years). Results were similar to Syaf's (2007) study examining patients who did not comply with treatment, which found that the majority (97.5%) had lower education levels supporting the hypotheses that lower educational levels is positively correlated with non-adherence.

The level of knowledge significantly influences the incidence of dropout in patients with pulmonary tuberculosis in which the risk of dropout events in patients with pulmonary tuberculosis at low knowledge level is 34 times greater than patients with high knowledge level which is similar to the results of Agustin (2010).

Income also significantly affects the incidence of dropout in patients with pulmonary tuberculosis. The risk of dropout events in patients with pulmonary TB who have an income deficit is five times greater than those who have an income surplus. Based on this analysis, consideration of patients for treatment at a given clinic must take into account their net income. Although the government has sought to provide free antibiotics for all patients with pulmonary TB, the patient's disposable income may be insufficient for necessary transportation to the health centre to take the antibiotics or for the additional cost of sputum examination. Results were similar to the study conducted by Syaf (2007) demonstrating a significant

affect of earnings on non-compliance with pulmonary TB treatments ($p=0.006$). The majority of people (75%) have an income below the minimum wage. According to Lestari (2009) people with low incomes lack basic amenities and cannot live healthy lives since the characteristics of life such as health behavior, education, housing and others aspects of family economy are impacted negatively. In relation to health only high income families will be able to adequately meet their nutritional needs, and care needs along with increased expenditure during illness that would help to fight against the risk of dropout of treatment for pulmonary TB.

Analysis based upon occupation status and drop out ($p=0.002$), demonstrates that individual's employment status, or that of key family members, significantly influences the incidence of dropout from medical treatment programme. The risk of dropout events in employed patient with pulmonary TB is 14.66 times greater than in patients who are unemployed. While this may appear to be contradictory, since income would be expected to fall sharply with unemployment, further analysis of the type of employment provided some insight which may explain this finding. The majority of patients who dropped out are employed as laborers (66.7%), including farm work, drying rice, unskilled construction workers and mechanics. Laborers wages are determined by their output, measured in terms of the number of products or services they provide, and often this income does not meet the minimum family living costs. Longer hours to increase their income, often involving overtime or one or more additional jobs, often leaves insufficient time for these patients to fulfill the obligation to engage with TB treatment.

External factors affecting Drop out

Side effects of antibiotics were a complaint that some respondents experienced when taking antibiotics. This analysis confirmed the assumption that severe side effects of antibiotics in patients with pulmonary TB results in high risk of patient dropout. The risk is equal to 7.82 times higher compared with patients who experience no side effects, according to this analysis ($p= 0.003$) the risk is equal to 7.82, significance at CI 95%.

Based on the interviews, the majority of elderly

people who dropout from the medication regime suffer from hearing loss which is one of the known side effects of TB regimens, which provides a tangible motive to stop treatment. This effect may be exacerbated by increased age. Drugs can lead to allergies and a bad taste would affect adherence to treatment. However, Syaf (2007), using the same government approved antibiotics, produced in the same factory as this study, found 70% of patients did not experience unpleasant side effects and thus found a non-significant correlation ($p = 0.998$) between side effects and dropout rate.

The ease of transportation significantly influences the incidence of dropout, and if we see the results of calculations based on the Odds Ratio the value of the risk of dropout events in patients with very difficult transport is 15 times greater than in patients whose transport was easy. While the risk of dropout events in patients with difficult transport is 3.33 times greater than in patients with easy transportation. In other words, this analysis supports the assumption that the more difficult accessibility of patients in term of transportation, the risk to dropout is higher. This is very important since the commitment to attendance at the health centre involved a minumum of 10 visits as follows; 3 for sputum analysis to confirm diagnosis prior to medication, 6 visits to take the medication and a final visit for evaluation to determine the success of treatment. The majority of respondents who had dropped out from medication did not have their own transportation vehicle. It is very difficult to reach public transport facilities because the location of dwellings is mainly in the remote areas. This finding varies from that of Syaf (2007) which showed no significant effect of non-compliance with a value of $p = 0.988$.

Distance traveled by the respondents to the health centre must also be viewed alongside details of the terrain which for most patients would be hilly uneven tracks or roads and not infrequently the homes of respondents who drop out also require passage through steep paths. This situation is exacerbated by the difficulty of access to public transport for patients who do not own a motor vehicle. Patients, who are of course sick, often had to walk long distances. Unlike the respondent in Panarukan Community Health Centre area where the average distance to terrain is easily accessible by public transport was low. Thus, the transportation to health centre in Panarukan Community Health Centre was not a significant problem. This is similar to the findings of Supriyanto

(Syaf 2007), demonstrating that the distance from the patients' residence to the place of care is inversely proportional to the number of patients who drop out of a treatment programme. Clearly the distance from patient residence to place of treatment should be kept as close as possible (three to five kilometers), as recommended by WHO (Syaf 2007).

The role of the 'treatment observer' was to achieve set aims by accompanying and observing treatments delivered at the health centre and then to monitor and encourage patients to diligently take drugs, provide reminders about the need to check sputum, collect information on families suspected of having pulmonary TB, monitor side effects or complaints related to the medication and send this data to the health centre, as well as administering funds for transportation for health centre visits.

Patients with less support from their 'treatment observer' has a risk of dropout 19 times greater than in patients who felt that their 'treatment observer' provided good support. Based on the interviews, it is known that the majority of respondents who drop out have a 'treatment observer' who usually are close family members. TB education for PMO is given to the designated family member who accompanies the patient to community health centre. While there were some excellent PMOs present in the family members who were consistent and accompanied patients more often by a range of different family members who were not the designated PMO. Consequently some of the PMOs have insufficient grasp of the information, knowledge and skills to fulfill their role. In contrast most of the patients who did not dropout had a PMO who was also a health care worker, such as the village midwife, midwife from Community Health Centre, health centre personnel, paramedics or others. In addition, sometimes PMOs were Community Leaders, for example, village chief or the head of the hamlet.

DISCUSSION

Based on analysis of the above findings it can be concluded that internal factors that influence the incidence of drop out in patients with pulmonary TB include their knowledge, occupation, education and income. While external factors that influence the incidence of dropout in patients with pulmonary TB include the 'treatment observer' support, transport accessibility and adverse effects of antibiotics. Necessary improvements in relation to the general

knowledge in society, especially in remote difficult to reach areas, need increasing the frequency of counseling and motivation on an ongoing basis to patients in order to complete the treatment until cured, all involve community leaders, local health workers, health cadres, and all patients with Pulmonary TB. Motivation and training to the 'treatment observer' to foster passion, along with providing tangible incentives are key to making this public health effort more effective. Providing training to health care workers and primary health workers in sub-district clinics and village clinic (called Polindes in Indonesia, located in each village) on how to implement the National TB program is also recommended. Besides health care workers in village clinic need to know how to deal with pulmonary TB patients who want to take antibiotics. Health workers are a very important element, it is necessary to further improve services through an individual approach to assess specific needs for best solution to be found to facilitate compliance during the treatment process. Need to increase home visits on a regular basis in order to ensure continuity of treatment

of patients with pulmonary TB. Attempts to ensure the PMO, comes from community heads, the local health officer, or cadre, and display consistency, so that the observer can monitor the whole process with the patient from diagnosis through to cure. There remains a need to enhance the role of community leaders and religious leaders with a good basic understanding of the disease and treatments to provide counseling to pulmonary TB patients through lectures, recitals and meetings of citizens, as well as raising community awareness and motivation to take on the role of treatment observers for people in the locality. While it is known that the therapy for TB may be effective and indeed curative there is a clear need for this type of community based action and the personal and practical support and motivation should be provided by a treatment observer if the treatment is to have its full clinical effect.Working together by direct participation in the TB control program, in coordination with health officials, rural Indonesian communities have the prospect and huge potential to increase case detection and cure of TB patients.

Fig 1 : Rehabilitation concepts related to TB in rural Indonesia
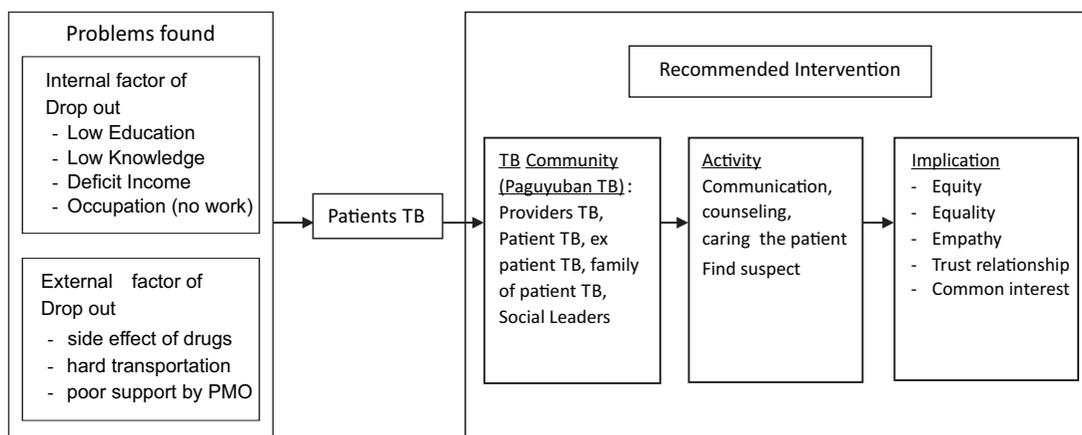
CONCLUSION

TB requires long term treatment and some patients will require rehabilitation as outlined in figure one. Based on the concept above, we can conclude that health professionals and other practitioners in the Indonesian health services must have not only accurate medical knowledge but also require community empowerment and mobilization skills. However, according to WHO-SEARO (Detikhealth, 2012), medical education in

Southeast Asia concentrates on clinical aspects and neglects community needs and factors affecting patient compliance and have a deficit in   public health knowledge.   Indonesia health professional and practitioner curriculum should be reformed to add more public health contents especially community empowerment and mobilization.

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