The Relationship between 12MWD and Quality of Life in Tuberculosis Sequelae Patients

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ABSTRACT

Background: The incidence of TB cases in Indonesia is very high. Although it was undergoing treatment and was declared cured the infection, but it does not mean that the infection does not leave sequelae. Patients TB sequelae decreased functional capacity and quality of life.
Aim: The purpose of this study is to determine the relationship between functional capacity (12MWD) and quality of life (SGRQ) in tuberculosis sequelae patients.
Method: Patients with TB sequelae aged 18-59 years without comorbid examined functional capacity with a 12-minute walking distance test and assessment of quality of life using the SGRQ questionnaires. Statistical analysis is using correlation and regression.
Result: There were significant negative correlation ($p<0.05$) between the 12 minute walking distance and activity domain (r -.336). In other domains, there is a negative relationship but not significant at the total domain (r -.152), impacts (-.124), and symptoms (-.043).
Conclusion: There is a significant negative relationship between the 12 minute walking distance and quality of life as assessed by questionnaire SGRQ in activity domain, in other domains there is also a negative correlation but was not statistically significant. The higher of functional capacity patients with tuberculosis sequelae, the quality of life also become higher.
Keywords: functional capacity, 12MWD, quality of life, SGRQ, tuberculosis sequelae.

ABSTRAK

Latar Belakang: *Kejadian kasus TB di Indonesia sangat tinggi. Meskipun sudah menjalani pengobatan dan dinyatakan sembuh infeksinya, namun bukan berarti infeksi tersebut tidak meninggalkan gejala sisa/sekuele. Pasien sekuele TB ini mengalami penurunan kapasitas fungsional dan kualitas hidup.*
Tujuan: *Tujuan penelitian ialah mengetahui hubungan antara kapasitas fungsional (12MWD) dengan kualitas hidup (SGRQ) pada penderita sekuele tuberkulosis.*
Metode: *Pasien dengan sekuele TB usia 18-59 tahun tanpa komorbid diperiksa kapasitas fungsionalnya dengan uji jalan 12 menit dan penilaian kualitas hidup menggunakan kuisioner SGRQ. Analisis statistic menggunakan uji korelasi dan regresi.*
Hasil: *Terdapat hubungan negatif yang bermakna ($p<0,05$) antara uji jalan 12 menit dengan domain aktivitas (r -.336). Pada domain yang lainnya, terdapat hubungan negatif namun tidak bermakna yaitu domain total (r -.152), dampak (-.124), dan gejala (-.043).*
Kesimpulan: *Ada hubungan negatif yang bermakna antara uji jalan 12 menit dengan kualitas hidup yang dinilai dengan kuisioner SGRQ pada domain aktivitas, sedangkan pada domain lainnya juga terdapat hubungan negative namun tidak bermakna secara statistik. Semakin tinggi kapasitas fungsional penderita sekuele TB, semakin tinggi pula kualitas hidupnya.*
Kata kunci: kapasitas fungsional, 12MWD, kualitas hidup, SGRQ, sekuele TB

INTRODUCTION

Tuberculosis is an airborne infectious disease and it caused by Mycobacterium tuberculosis. The sequelae of tuberculosis (TB sequelae) are defined as a condition with many secondary complications after TB recovery, such as chronic respiratory failure (CRF), cor pulmonale, or chronic pulmonary inflammation. TB sequels affect the functional capacity and quality of life of the patients. Functional capacity is a person's ability to perform aerobic work defined by maximal oxygen uptake (VO2max) which can be measured using 12 MWD. Physical and functional limitations can lead to decreased quality of life. Quality of life involves a wider dimension including physical, psychological, self-sufficiency, social relationships, beliefs about illness and the environment. In Post TB patients can be measured with SGRQ.

METHOD

The research design is a correlation analysis with cross sectional study. The study was conducted at the Lung Polyclinic of Dr. Sardjito General Hospital and BP4 Yogyakarta. The study period starts from September 2013 to October 2013. The target population is TB patients who have been treated for at least 6 months and have been declared cured with AFB (-) and left sequelae (sequelae) on examination of chest x-rays. Affordable populations are post TB sufferers who visit the Lung Polyclinic of Dr. Sardjito General Hospital and BP4 Yogyakarta. The inclusion criteria of the study subjects were post-uptodontal TB patients based on anamnesis, physical examination, chest radiology examination in the presence of fibrosis, aged 18-59 years, approved and signed informed consent. Various secondary complications after TB is declared cured, such as chronic respiratory failure, cor pulmonale or chronic pulmonary inflammation. Patients did not have comorbid silicosis, post thoracic surgery, bronchial asthma, chronic heart failure, collagen disease, and severe chronic disease. The sample size was determined using the large sample table for correlation research, with α = 0.05, β = 0.9, and r = 0.42 got the sample size of 45. The independent variable is the functional capacity. The dependent variable is quality of life.

TB sequelae is a condition with many secondary complications after TB is declared cured, such as chronic respiratory failure, cor pulmonale or chronic pulmonary inflammation (Machida, 2005). 12 Minutes Walking Distance is a 12-minute road test to evaluate patients with pulmonary disease. The distance traveled is used as a measure of cardiopulmonary and musculoskeletal adaptations to pulmonary disorders (Kosak et al., 2005). St. Georges's Respiratory Questionaire (SGRQ) is an assessment of quality of life by interview method using SGRQ questionnaire consisting of 76 questions which are adjusted to specific areas to 51 items of questions are divided into three components: Symptoms of disease, associated with symptoms of shortness of breath, frequency and severity of the symptoms. Activity, associated with activities that cause shortness or inhibited by shortness. Impact, encompassing a series of aspects related to social functioning and psychological disorders resulting from the illness. The value of each question is summed to 3 groups (symptoms, activity and impact). Values ranging from 1 to 100 and lower values indicate improved quality of life (Ikalius et al., 2007).

Data analysis is descriptive where variables with numeric scale are calculated as mean and standard intersections, whereas variables with categorical scales will be described as number and percent. Bivariate analysis with correlation test and linear regression was used to analyze the closeness of the relationship between functional capacity and quality of life. Subjects, who met the inclusion criteria, were educated, informed and performed anamnesis and vital sign checks. All subjects examined 12 MWD and filled out the SGRQ questionnaire. The results of the history, vital sign checks, 12 MWD, and SGRQ are recorded in a special form for each subject with an identification number in each form.

Measurements use functional capacity based on 12 min (12 MWD) road test. Quality of life based on St. Questionnaire George's Respiratory Questionaire (SGRQ) filled by the patient.

RESULT AND DISCUSSION

From this research, it is found that based on gender of research subjects who are TB sequence sufferers are more common in men than women, ie 2: 1 as shown in table 3. Of 42 data found that there are 28 men (66.7%) and 14 women (33.3%). Pasipanodya (2007) obtained data from 107 research subjects who are sekuele TB patients, 74 people or 69% are men. Pasipanodya (2010) obtained data that patient of TB sequel in Tarrant, Texas where there were assessed using Disability-adjusted Life Years (DALYs), obtained men as many as 745 DALYs and women as many as 280 DALYs. Harada et al. (1990) in Japan mentioned the frequency of sequelae of TB occurs in about 6% of the population of lung disease patients who come to the hospital. TB sequelae are more common in men than women with a 2: 1 ratio. These three results confirm that the majority of people with TB sequelae are men; this is also supported by the risk factors of men's tendency to smoke, be outside the home, and also easier to associate with anyone making them more vulnerable to contracting tuberculosis.

Table 3 Sample of distribution based on gender

gender	amount	percent
Male	28	66.7
Female	14	33.3
Total	42	100.0

This study found that subjects who are TB sequelae have an average age of 36.2143 years with a standard deviation of 10.37477. In Naso et al., (2011) obtained data on TB sekuele patients in subjects with single treatment of 32.93 ± 10.25 years and subjects with multiple treatments and multidrug-resistant pulmonary tuberculosis (MD-RTB) 38.67 ± 10.56 years. Long, R et al, (1998) got the study subjects of TB patients who had been treated and there were sequeale averages aged 36±15 years. Ramos, LM et al, (2006) got the subject of his research with an average of 30 years. Generally, people with TB sequelae are 30-40 years old, this may caused at that age a person is productively working and has the opportunity to meet with a variety of people and making them more susceptible to contracting tuberculosis and eventually suffering from a sequeale of Tuberculosis.

In addition, when patient busy with their activities, when the symptoms of TB appear they not too concerned and checked themselves, so that TB bacteria have damaged various tissues into irreversible tissue and when TB is treated it will leave a sequeale.

Table 4 Sample of distribution based on age

	age
average (th)	36.2143
Standard deviation (th)	10.37477
Minimum (th)	19.00
Maximum (th)	55.00

Characteristics of lung function of the patients can be seen in table 5. It is known that there is a minimal decrease in lung function of patients' sekuele TB in the study. Patients were classified as a disorder if FVC and / or FEV1 were <80% predictive or no disturbance if >80% prediction (Pasipanodya et al., 2007)

Table 5 Characteristics of Spirometry test results

	average	Standard Deviation
FVC(%prediction)	79.60	21.70
FEV1 (%prediction)	81.24	17.34
FEV1/FVC	0.90	0.15

From this study it was found that the distance traveled within 12 minutes in patient's sekuele TB average 515.0714 m with standard deviation 144.27420 m. In this 12 minute road test, the farther the subject traveled, the better the functional capacity of the subject. Standardized Response Mean (SRM) states that the 12-minute road test was the most sensitive to the patient's state change compared to the 2-minute and 6-minute walk (Kosac, M et al, 2005). Of all the subjects studied, all could perform a 12-minute road test with no significant side effects or complaints.

Table 6 Characteristics of cigarettes consumption

	amount
Active smoker	12 (28.6%)
Ex Smoker	11 (26.2%)
Passive smoker	10 (23.8%)
Non smoker	9 (21.4%)

In Willcox et al. (1989) research there were 41 subjects, 24 were active smokers, 3 were former smokers, and 14 were non-smokers. The study illustrates that most people with tuberculosis are smokers and who have been exposed to cigarettes. Snider et al. (1971) in Willcox et al. (1989) found that smoking was unimportant in airway obstruction and suggested that this was probably related to the dominant effects of tuberculosis. Krishna et al. (1977) in Willcox et al. (1989) on the other hand found that FEV1 was significantly lower in smokers than non-smokers and former smokers. This is very likely because there is an additional effect of smoking with tuberculosis in causing airway obstruction. Approximately 90% of COPD patients are smokers but only 15-20% of smokers suffer from COPD (Ikalius et al., 2007). From some information above, it is known that obstructive pulmonary disease in patients with tuberculosis is mainly due to the severity of the disease. On the other hand, the effect of smoking on the incidence of obstructive pulmonary disease in patients with tuberculosis, in smokers risks increased. However, without suffering from tuberculosis, subjects who smoke already have a great risk for obstructive pulmonary disease.

Table 7 Distribution of 12 MWD result

Average (m)	515.0714
Deviation standard (m)	144.27420
Minimal (m)	80.00
Maximal (m)	888.00

In this study there are four domains to assess the quality of life assessed using the SGRQ questionnaire ie there are total dimensions, symptoms, activities, and impact. The adjusted SGRQ questionnaire can objectively assess disease effects on everyday life (Ikalius et al, 2007).

The value of each question is summed to 3 groups (symptoms, activity and impact). Values ranging from 1 to 100 and lower values indicate improved quality of life (Ikalius et al, 2007). All subjects did their own questionnaires accompanied by researchers if they did not understand the question intent on the questionnaire. Distribution of quality of life can be seen in table 7. In the manual of the use of SGRQ questionnaire, it is explained that the higher the SGRQ questionnaire score, the worse the quality of life.

Table 8 Quality of life distribution

Dimension	Total	symptoms	Activity	impact
Average	19.0269	20.34107	16.5417	20.0217
SD	17.63104	19.97227	24.43890	18.36079
Minimal	.00	.00	.00	.00
Maximal	65.86	81.96	81.02	74.70

From result of Spearman correlation test analysis using SPSS 16 application got result that 12 minutes walking distance have significant negative correlation with quality of life in activity domain with correlation coefficient -.336 and with significance level <0.05. While the quality of life in the total domain, symptoms, and effects are both negative but not significant because the level of meaning> 0.05. For the complete correlation value can be seen in table 9.

Table 9 Correlation between 12 MWD test with quality of life in each domain

dimension		MWD12
Total	correlation coefficient (r)	-.152
	Significance (p)	.336
	N	42
symptoms	correlation coefficient (r)	-.043
	Significance (p)	.738
	N	42
Activity	correlation coefficient (r)	-.336*
	Significance (p)	.030
	N	42
Impact	correlation coefficient (r)	-.124
	Significance (p)	.434
	N	42

*.meaningful correlation at α=0.05.
**.very meaningful correlation at α=0.01.

The result of this negative correlation indicates that when the higher the 12-minute road test score then on the assessment with the SGRQ questionnaire get the lower score. Given the results of the 2-tailed correlation test, and vice versa, the higher the SGRQ questionnaire score, the 12-minute test score becomes lower. This also means that the higher the functional capacity of the subject, the higher the quality of life of the subject, because in the assessment of functional capacity the farther the distance traveled the functional capacity is better, while on the quality of life evaluation using the SGRQ questionnaire the lower the score the better the quality His life.

Gupta & Kant (2009) (in Rini, 2011) says that quality of life is a condition of combined health status of several dimensions experienced by patients suffering from a disease. These dimensions include symptoms, physical function, cognitive, psychosocial conditions, emotional status, perceptions, and beliefs about the ability to behave in health, all of which greatly determine the quality of one's life. In the graphic below, there is also a picture of the relationship between a 12-minute road test with each dimension on quality of life assessment with a SGRQ questionnaire.

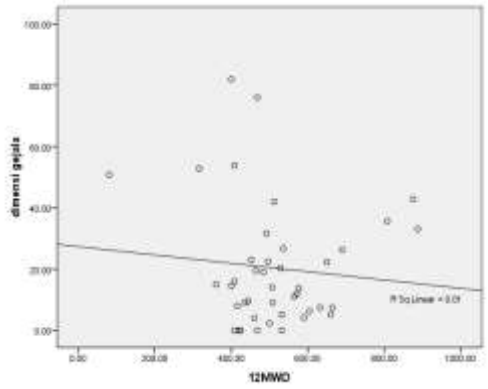

Figure 4 Correlation between 12 MWD test with symtoms dimension

This component deals with the effects of respiratory symptoms, frequency, and severity of the patient. This respiratory disorder also certainly affects the ability to perform physical activities. Therefore, this domain has a correlation relationship with functional capacity. In this study, there was a relationship between a 12-minute road test and a dimension of symptoms but not significant. In the dimensions of symptoms, assessed the effect of sequelae on respiratory function is whether there is severity. A sustained decrease in HRQL may be in part due to persistent physical symptoms and residual physiological damage from disease and or treatment. Physical health appears to be more affected by the disease but improves more quickly after treatment, while the decline in the value of mental health is likely to persist for the long term (Guo, N et al., 2009).

On spirometry examination, it was found that the patient had decreased function at a mild level. Symptoms of pulmonary disorder generally do not occur in people with chronic lung disease until FEV1 falls to 50% of normal value (Pasipanodya et al., 2007). Because in this study the decrease in lung function is still mild, then the symptoms of lung disorders have not appeared. The ability in this road test depends on motivation, endurance, heart-lung function and neuromuscular function (Tianusa N, 2003). With the decline in lung function, there must be a decrease in the patient's ability to perform a 12-minute road test. Although pulmonary function decline in this study had already affected the road test, the symptoms of lung disorders had not yet emerged. Therefore, the relationship between the 12-minute road test and the dimensions of the symptoms was not significant because new symptoms appeared after significant pulmonary function decline, whereas functional capacity decreased with decreased lung function.

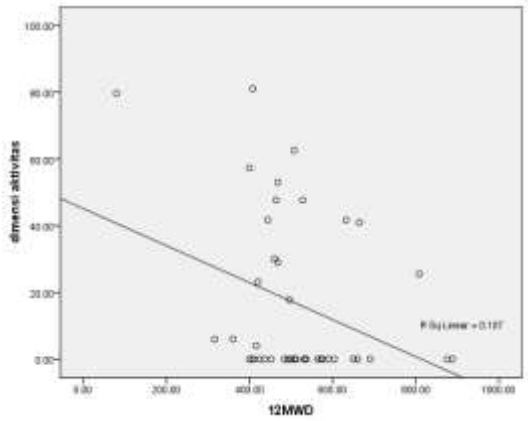

Figure 5 Correlation between 12 MWD test with activity dimension

In the activity domain, what is assessed is when the activity causes shortness of breath or shortness of breath to limit activity. From the

results of the study found that the domain of this activity has a significant relationship with functional capacity. On a 12-minute road test, the distance traveled was used as a measure of the adaptation of the musculoskeletal system and the cardiopulmonary system in pulmonary disorders (Kosac, M et al, 2005). Because activity is also closely related to the musculoskeletal and cardiopulmonary systems, the 12-minute road test and the activity dimension have significant relationships.

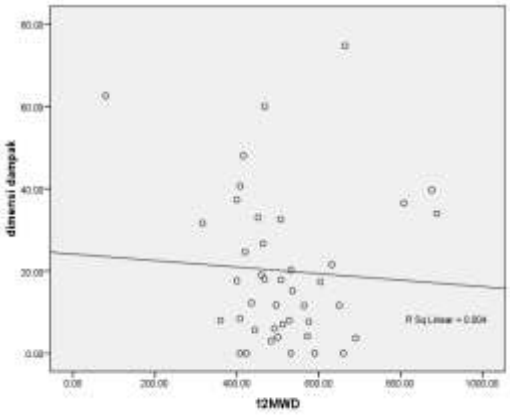

Figure 6. Correlation between 12 MWD test with symptoms dimension

In the SGRQ questionnaire manual it was explained that the impact scores included various psycho-social dysfunction disorders. This domain relates in part to respiratory symptoms, but also strongly correlates with exercise performance (a 6 minute walking test), shortness of breath in everyday life (MRC breathless scores) and mood disorders (anxiety and depression) (SGRQ manual, 2009) . Although the analysis results are not significant, there is evidence that there is a correlation between functional capacity / exercise performance with impact domains. Women are much lower in mental and social health scores than men. Compared with younger people, the elderly have a physical and mental health score that is much lower (Guo, N et al., 2009). In this study, the average patient was the productive age and most of the men. This illustrates that patients in the study tend to have good mental health, so psychic effects such as depression and anxiety in patients in this study did not appear. In general, physical health sub-scales are more affected than mental (Guo, N et al., 2009). Because the 12-minute road test is closely related to pulmonary function decline, whereas in this study the pulmonary decrease is still mild and does not cause symptoms as well as the condition of patients who tend to have good mental health causes the impact of sequelae on the patient's psychic does not arise, so the correlation between road test 12 Minute with the impact dimension having an insignificant relationship.

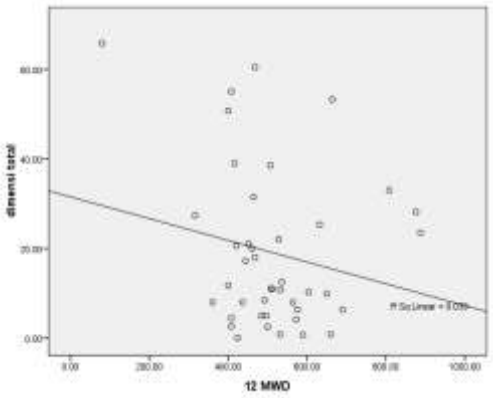

Figure 7. Correlation between 12 MWD test with total dimension

The total score summarizes the impact of the disease on the overall health status. The score is expressed as the percentage of overall decline in which 100 represents the worst health status and 0 indicates the best health status. Because these scores summarize all of them, then if the three other domains have a correlation relationship with functional capacity, then the domain is also definitely have a correlation relationship with functional capacity.
In this study, there are some limitations of the study. Because the design of this study is cross sectional, the researchers only do data retrieval and observation in one time only. Researchers do not follow the development of the patient's disease, so that the condition of the lung before suffering from TB there is no data. This condition may cause bias to the results of lung condition checks on the subject of sequelae TB sufferers, because it could be worsening of lung conditions have occurred since before suffering from tuberculosis due to risk factors such as cigarette exposure. This can be reinforced because most of the subjects suffering from TB sequelae are smokers, while smokers themselves already have a big risk for obstructive lung disease, so there is a possibility of bias on the results of the lung condition of patients with TB sequelae whether the obstructive pulmonary disease of TB sequelae is purely due to severity

TB disease or it has been around since before suffering from TB.

CONCLUSION

There was a significant negative relationship between the 12-minute road test and the quality of life assessed by the SGRQ questionnaire on the activity domain, whereas in other domains there was also a negative but not statistically significant relationship. The higher the functional capacity of patients with TB sequels, quality of life also becomes higher. More research needs to be done about the TB sequel, as there are few sources of literature on TB sequels, especially in Indonesia. In taking data, need to consider the location of research.

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