ORIGINAL ARTICLE

Validity and Reliability of the Indonesia version St. George's Respiratory Questionnaire

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ABSTRACT

Introduction: St. George's Respiratory Questionnaire (SGRQ) is a measuring tool to assess the quality of life of people with chronic obstructive pulmonary disease or various respiratory disorders. This study aimed to assess whether The Indonesian version of SGRQ was valid and reliable for subjects with chronic obstructive pulmonary disease (COPD).

Methods: The Indonesian version of SGRQ was analyzed using a correlation test between SGRQ and six-minute walk distance (6 MWD) for validity. The reliability test was done using the test re-test reliability test by Spearman's rank correlation, and Cronbach's alpha for internal consistency.

Results: Twenty-two patients eligible COPD patients were included in this study. There is a correlation between SGRQ's component and 6MWD on activity (r= 0.49), impact (r= -0.58) and total SGRQ (r= -0.56). The SGRQ re-measurement test shows a strong correlation on the symptom (r = 0.76), activity (r = 0.58), impact (r = 0.51), total (r=0.58) and Wilcoxon test result shows there were no significant differences among subscales except total value p = 0.049. High internal Cronbach's alpha consistency was approximately 0.73 to 0.86.

Conclusion: The Activities and Impacts of Indonesian version of SGRQ component provides a picture of the validity to functional capacity. The Indonesia version of SGRQ is also proven to have good repeatability with high internal consistency.

Keywords: *St. George Respiratory Questionnaire, Indonesia version, Chronic Obstructive pulmonary disease, Respiratory Disorders, six-minute walk distance, validity, reliability*

ABSTRAK

Pendahuluan: St. George's Respiratory Questionnaire (SGRQ) merupakan salah satu alat pengukur yang digunakan untuk menilai kualitas hidup seseorang dengan penyakit paru obstruktif kronis (PPOK) atau gangguan pernafasan lainnya. Tujuan dari penelitian ini adalah untuk melihat apakah SGRQ versi Indonesia valid dan dapat diandalkan untuk seseorang dengan PPOK.

Metode: SGRQ versi Indonesia dianalisa dengan uji korelasi antara SGRQ dan six-minute walk distance (6MWD) untuk validitas. Uji reliabilitas dilakukan dengan menggunakan re-test uji reliabilitas oleh korelasi Spearman dan Cronbach's alpha untuk konsistensi.

Hasil: 22 pasien PPOK yang memenuhi syarat dilibatkan dalam penelitian ini. Terdapat korelasi antara komponen SGRQ dan 6MWD saat aktivitas (r=0.49), dampak (r=-0.58), dan total SGRQ (r=-0.56). Uji pengukuran kembali SGRQ menunjukkan terdapat korelasi kuat terhadap gejala (r=0.76), aktivitas (r=0.58), dampak (r=0.51), total (r=0.58) dan uji Wilcoxon menunjukkan tidak terdapat perbedaan bermakna antara subskala kecuali nilai total p=0.049. Konsistensi alfa Cronbach internal yang tinggi sekitar 0,73 sampai dengan 0,86.

Kesimpulan: Komponen aktivitas dan dampak dari SGRQ versi Indonesia menunjukkan keabsahan dari pengukuran kapasitas fungsional. SGRQ versi Indonesia juga terbukti memiliki pengulangan yang baik dengan konsistensi internal yang tinggi.

Kata Kunci: *St. George Respiratory Questionnaire (SGRQ) versi Indonesia, Penyakit Paru Obstruktif Kronis (PPOK), Gangguan Pernafasan, Six-minute walk distance, Keabsahan, Reliabilitas.*

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INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is a leading cause of morbidity and mortality worldwide that induces an economic and social burden that is both substantial and increasing.[1] Reportedly in 2012; the prevalence of COPD is 4.5 % in Indonesia and 9.5 % in Taiwan.[2] On the bright side, COPD is a disease that can be preventable and treatable[1], therefore it requires a tool to recognize both the progression and impact.

World Health Organization (WHO) 1980 made an International Classification of Disease (ICD) supplement for rehabilitation, namely International Classification of Impairments, Disabilities, and Handicaps) ICIDH. Pulmonary disorders classified into pathology, impairment, disability, and handicaps. Impairment is an exteriorization of a pathology state and can determine by laboratory tests. Disability is the ability to carry out activities in the scope of

activities that are considered normal. In this situation, dynamic functions decline, work limitations, and physical performance occur. Handicap in respiratory symptoms is a result of impairment or disability, which results from a person being unable to perform social skills or acting like their normal state. For example, a reduction in performance results in the inability to work.[3,4] Objectively, SGRQ is suitable with ICIDH (illustrated in the component of disability, handicap).

SGRQ is a measure of quality life that is comparatively short and has been validated in several countries, which can differentiate the level of health in patients, sensitive to significant clinical changes, and this measure has the right level of reliability.[5,6] Zamzam and colleagues found an increase in COPD severity associated with an increase in the value of SGRQ, and SGRQ can be used to assess the quality of life in COPD[7]

In 2001, SGRQ has been translated into 36 languages. The Indonesian version of SGRQ was translated from the original English version from PW Jones. With the same translation procedure, on Paramita's research Validity and reliability of the Indonesian version of the Brief Fatigue Inventory in Cancer Patients (2016)[8] translating with the help of two residences into Indonesian, then being translated back into English.

Six-minute walk distance in this study using 15 meters track. In 2001, there was no recommended tracks for 6 MWD. In 2002, ATS recommended the tracks should be 30 meters in length. But, in 2018, Nury reported the validity of 15 meters track for 6 MWD. The length of the track has been a concern because the patients must walk back and forth in 6 minutes. ATS stated that a shorter corridor requires patients to take more time to reverse directions more often, reducing the 6MWD. Nury, et al showed that the distance result from walking on 15 meters track was not significantly different from the distance result from walking straight. Nury et al compared it with walking on Biodex Gait Trainer.[9,10]

The track was performed indoors with a flat and hard surface as recommended by ATS. ATS also recommended instructing the patients to walk as far as possible, without running nor jogging. ATS stated that the patients may stop to take a rest and may continue to walk if the 6 minutes have not reached yet. ATS also recommended that the patients should be reminded about the time every one minute with an even tone of voice. Nury study also recommended a flat and hard surface, a reminder every one minute, and an even tone of voice without encouragement. Both ATS and Nury suggest a self-paced walking speed for 6 MWD.[9-11]

All subjects who completed the study statistically fulfilled the candidate's requirement. The majority of the subject is male. This suitable for GOLD 2001 and also GOLD 2020 which states the majority of COPD are men. In GOLD 2001 until GOD 2020 stated that the COPD prevalence among women increases. It correlates with the smoking habit among women. Some studies have submitted that women are more susceptible to the effects of tobacco smoke than men.[1,12]

In parallel to this, the six-minute walk distance (6MWD) is a well-known functional capacity test recommended by the American Thoracic Society (ATS)[10] and been validated in various countries including Indonesia. [13-15]

This current study aimed to test the validity and reliability of Indonesian SGRQ with COPD subjects. Validity test utilized the correlation between Indonesia SGRQ and 6MWD. Whereas the reliability test was done by comparing two measurements as well as a statistical test. Internal consistency Cronbach α was used for analysis.

METHOD

The subjects were a COPD outpatient at the RSPUN Dr. Cipto Mangunkusumo Jakarta and RSU Persahabatan Jakarta with FEV_1 <80% normal prediction, without asthma history, not having an exacerbation, had no change in medication during the past four weeks, understand Indonesian language. The inclusion criteria are FEV_1 <80% normal prediction, no history of asthma, not having an exacerbation, had no change in medication during the past four weeks, understand the Indonesian language. We excluded patients with a cardiac disorder, cor pulmonale, neurological disorders, cognitive impairment, and tracheostomy.

Indonesian version SGRQ translated from English to Indonesian after having permission from PW Jones. The questionnaire form was translated into Indonesian by an Indonesian physical medicine resident with fluent English. Indonesian SGRQ was then translated back by English institutions. The final translation was compared with the initial SGRQ. The Questionnaire consists of 76 questions accumulated into a total score. The three-component scores calculated were symptoms, activity, and impact.

Every item has a predetermined weight. The range is from 0 (best) – 100 (worst). The total score is the sum of the first part of the questionnaire which is the symptom domain, consists of 8 questions with maximum score 662.5; the second part is activity domain, consisting of 6 questions with maximum score 1209.1; and the third part is impact domain with maximum score 2117.8. The total score of SGRQ is 3989.4.

All the subjects filled out the SGRQ form two times with a gap of 3-7 days before the second attempt. The subjects filled the form guided by the researcher. The researcher then assessed the form. The results were displayed according to the domain.

The test of Six-Minute Walk Distance (6 MWD) was done three times, the first two tests were for familiarization and the third test was done to measure the distance in meters. This test was done on a 15-meter track. Subjects may stop walking if they felt tired or had shortness of breath (Borg Scale 7-8). If the subject stopped while the six-minute time has not passed yet, the subject may resume walking until the time ended. Every 30 seconds, the subjects were encouraged to increase or maintain their walking speed and were reminded about the remaining time.

The validity test is done by correlating the quality of life SGRQ and the distance from a six-minute walk distance. Analysis by using Spearman's rank correlation was done. Wilcoxon test was used to test-retest the SGRQ measurements twice. The statistical results for the subscale were based on the Cronbach alpha coefficient.

RESULTS

This study was done from October 2001 to March 2002 and has reviewed by the University of Indonesia's Faculty of Medicine Research Ethics Commission (72 / PT02.FK / ETIK / 2001). Twenty-four subjects were involved in this study but two subjects dropped out. One subject couldn't do the six-minute walk distance and one couldn't complete the SGRQ II.

The baseline characteristics were shown in table 1. 86.4% of subjects were male with the mean (SD) age was 65,05 (7,73) years old and FEV_1 prediction was 35,5 (23-74) %. Most of the subjects were Javanese (36.4%) and the educational background mostly were junior and senior high school (22.7% and 31.8%).

Table 1. Baseline Characteristics

Gender	Frequency	Percentage
Men	19	86,4%
Women	3	13,6%
Race		
Javanese	8	36,4%
Sundanese	5	22,7%
Bataknese	6	27,3%
Minangnese	6	13,6%
Marital Status		
Marriage	21	95,5%
Single	1	4,5%
Profession		
Retired	14	63,6%
Private Sector	4	18,2%
Government Staff	2	9,1%
Entrepreneur	2	9,1%
Educational Background		
SD Elementary School	2	9,1%
Junior High School	5	22,7%
Senior High School	7	31,8%
Academy Degree	2	9,1%
Bachelor Degree	6	27,3%
Age (years old)		
FEV 1 (% predicted)		

Table 2 has shown the data of first and second SGRQ scores. The score of SGRQ was then correlated with the 6MWD.

Table 2. The Quality of life and The Six-Minute Walk Distance

Skor SGRQ	SGRQ I Mean± SD	SGRQ II Mean±SD	P*
Symptom	55,69±22,51	54,4±22,74	0,476
Activity	54,25±21,17	50,78±17,96	0,167
Impact	40,22±17,74	37,76±21,37	0,485
Total	47,01±16,28	43,33±16,41	0,049
6MWD (meter)	486 ± 58. 23		

Table 3 shows the correlation between SGRQ score and 6MWD, as the validation of SGRQ for functional capacity assessment. All the three domains and total score of SGRQ are negatively correlated to six-minute walk distance. The activity domain, impact domain, and total domain score were strongly correlated with the 6MWD.

Table 3. The Correlation between SGRQ and 6MWD

	SGRQ Score	6MWD
	r	p
Symptom	-0,11	0,634
Activity	-0,49	0,019*
Impact	-0,58	0,005*
Total	-0,58	0,004*

*spearman-rho test

Table 4 shows the comparison of the first and second SGRQ scores. Based on the Wilcoxon test, the symptom, activity, and impact domain did not differ significantly. Only the total score between SGRQ I and II have an almost significantly different result. Wilcoxon test was used to analyze the data because the data distribution was not normal. In the calculation of these two groups showed a decrease in the symptom score, activity and impact but there was no significant difference, while the total score showed insignificant with p = 0.05, this might be the accumulation of scores on the overall score so that there were substantial but had weak differences.

Table 4. The Comparison of SGRQ I and SGRQ II Score Result

SGRQ Domain	SGRQ I Score Mean± SD	SGRQ II Score Mean±SD	P*
Symptom	55,69±22,51	54,4±22,74	0,476
Activity	54,25±21,17	50,78±17,96	0,167
Impact	40,22±17,74	37,76±21,37	0,485
Total	47,01±16,28	43,33±16,41	0,049

* Wilcoxon test

Table 5 shows the correlation between the domain of the SGRQ. Spearman's rank correlation coefficient ranges from 0.51 to 0.76 which shows a strong and significant correlation between the two measurements. Internal consistency reliability among the point from the Indonesian version of SGRQ was calculated with coefficient Cronbach α. Internal consistency reliability of the total score α = 0.86 with 3 SGRQ components ranging from α = 0.73 to α = 0.80 (the minimum accepted value of α is 0.70). The higher the consistency, the higher the reliability value in the retest measuring instrument (test-retest reliability).

Table 5. Correlation study between SGRQ measurement

	S	A	I	T
Correlation coefficient Spearman's rank	R = 0,76	0,58	0,51	0,58
	P = 0,000	0,004	0,05	0,001
Cronbach coefficient α	0,73	0,80	0,79	0,86
S (Symptom), A (Activity), I (Impact), T (total)				

DISCUSSION

Based on the sample size calculation, this study needs 24 subjects with a statistical power of more than 90%. At the end of this study, only 22 subjects complete all the tests. This number of subjects reduce the statistical power to 88.61% but it is still can be accepted.[16]

The average age of this study was 65,05 ± 7,73 years. GOLD stated the COPD prevalence increase with age, the highest prevalence is above 60 years old. FEV1 predicted value in this study was 23-74%. This value shows that the subjects have a mild to severe COPD. This study has not classified the severity of COPD. All of the subjects undergone the 6 MWD. [1,12]

In the implementation of data collection 6MWD, all the subjects with FEV 1 prediction ranged 23-74% can do the 6 MWD completely. There was no report about subjects who stop or cannot continue the test. It is because all the subjects who have mild to severe COPD have undergone two times familiarization before the test. [1,12]

ATS recommends the SGRQ as the quality of life instrument for COPD patients. It said that the SGRQ as the disease-specific instrument designed to measure impact on overall health, daily life, and perceived well-being in patients with obstructive airways disease. The disease-specific instrument designed to measure the impact on overall health, daily life, and perceived well-being in patients with obstructive airways disease.[9]

The 6MWD is a practical simple test that requires a hallway but no exercise equipment or advanced training for technicians. Walking is an activity performed daily by all but the most severely impaired patients. It evaluates the global and integrated responses of all the systems involved during exercise, including the pulmonary and cardiovascular systems, systemic circulation, peripheral circulation, blood, neuromuscular units, and muscle metabolism. The 6MWD may better reflect the functional exercise level for daily physical activities.[9]

6MWD is a safe and reliable test to assess cardiopulmonary functional capacity, has a strong positive correlation with maximum oxygen consumption and also to assess the effectiveness of various forms of COPD management.[17] Six- MWD is more describing activities of daily life, as becoming the first option on clinical trials and research.[9]

Both SGRQ and 6 MWD are recommended by ATS. SGRQ is a health-related quality of life questionnaire and the 6 MWD is a test for functional capacity measurement. SGRQ is a questionnaire which is filled by the COPD patient. It records the symptoms, activity, impact, and total score for COPD. SGRQ was validated by its correlation with the 6 MWD. The validation test was done by correlating the subscale and total score of SGRQ with the walking distances. ATS also recommend validating the SGRQ with 6 MWD. ATS also validates the SGRQ with other health status instruments such as FEV 1, FVC, SaO2 at rest, MRC dyspnea grade, anxiety score, depression score, Sickness Impact Profile (SIP) total score, physical and psychosocial domains. ATS stated that the English version of SGRQ and others translated version including Asian region well validated with the 6 MWD.[18]

The data on table 2 have shown the Indonesian version of SGRQ score and walking distances from the third test of 6 MWD. For validation, each subscale and total score of the Indonesian version of SGRQ is correlated with the walking distances. The statistical analysis result is there was no correlation between them. A strong correlation was seen only between activity domain, impact domain, the total score of the Indonesian version of SGRQ and walking distances ($p<0.05$). There was no significant correlation between symptoms domain and walking distances. Dyspnea is the main symptoms caused by irreversible airway damage. Subjects did not report any dyspnea symptoms because they walked at her or his self -paced during the test. While the dyspnea is assessed in the symptom domain of SGRQ. Walking at his or her self-paced reflects their functional capacity that corresponds with the SGRQ. The median value of walking distances is 486 meters. This number was closer to the minimum value than its maximum value. The reason for the negative correlation was because the higher score of SGRQ means the worst condition of COPD patients. Otherwise, the longer walking distances means the better condition of COPD patient.[18,19]

The smaller value from SGRQ indicates a better quality of life. The longer distance as the result of the six-minute walk test, the better quality of life.[6,7,11] The validity test is done by comparing SGRQ and the distance from 6MWD. The correlation between the impact and total of SGRQ with the distance of 6MWD shows on activity and impact provides a pretty good validity for functional capacity.

The activity domain, impact domain, and total score of SGRQ have a strong correlation with 6 MWD. These results are the same with a study by Engstrom et al. While, symptom domain has a weak correlation with 6 MWD, Jones et al also reported the same finding.[20,21]

Lee et al (2017) found that the 6-min walk distance was significantly shorter in COPD patients with high SGRQ score than in those without high SGRQ score even within a similar grade of COPD, suggesting that functional exercise capacity, as measured by the 6-min walk test, was closely associated with HRQL irrespective of the severity of airflow limitation. They also recommend that the SGRQ can help to quantify changes in health status during clinical follow-up. Therefore, SGRQ is an important additional measurement along with lung function to evaluate disease severity in COPD.[22]

Table 4 shows the statistical analysis data of the Indonesian version of SGRQ I and SGRQ II comparison. Table 5 shows the reliability and internal consistency results of the Indonesian version of SGRQ. Reliability is a critical measurement property for health-related quality of life (QOL) instruments. Reliability refers to the consistency of scores obtained by the same persons when re-examined with the same test on different occasions or with different sets of equivalent sets of items There are many techniques available to measure reliability, including internal consistency and test-retest reliability.[23]

Test re-test on SGRQ and Spearman's rank correlation test shows a strong and meaningful correlation and also goo internal reliability. Likewise, with the non-parametric Wilcoxon test, there were no significant differences in the symptom, activity, and impact but in the total, slightly a weak difference in both measurements. The study of test-retest reliability for health-related QOL instruments has used varying intervals between test administrations. The interval has ranged from 10 minutes to 1 month. Most investigators have chosen an interval ranging from 2 days to 2 weeks. [23]

All of the subjects filled the Indonesian version of SGRQ I and II in separated days. It ranged between 3-7 days apart. It is expected that the subjects will not remember their previous answers after 3-7 days because the SGRQ consists of 76 questions. The SGRQ was chosen since it is a well-established health status measure used in many interventional and observational studies. The author suggests that the SGRQ should be done periodically for COPD patients.

The minimal important clinical difference (MCID) of SGRQ can be used for treatment evaluation. MCID is estimated as a 4 unit difference or change in the SGRQ total score.[11] Jones stated based on the empirical data and patient interview, MCID can be classified as 4 units total score change as a slightly efficacious treatment, 8 units for moderately efficacious change and 12 units for very efficacious treatment.[9]

The SGRQ was chosen since it is a well-established health status measure used in many interventional and observational studies. The minimal important clinical difference is estimated as a 4 unit difference or change in the SGRQ total score.[11]

A long-term randomized clinical trial by Hana Müllerova, Heather Gelhorn, et al shows that the SGRQ can be used to predict the exacerbations of COPD, hospital admissions due to exacerbations and their recurrence and all-cause mortality. This study divided SGRQ score into 4 quartiles, 1st: <32, 2nd: ≥32 and<46, 3rd ≥46 and <60, 4th ≥60, with the first quartile representing the best health status. The risk of adverse COPD outcomes increased with each increasing quartile of SGRQ score. When comparing the lowest versus the highest quartile, the event risk increased by 40% for exacerbations and a 26% increased risk of a recurrent episode, 2-fold for hospital admissions and more than 2-fold for all-cause mortality.[24]

Considering that the Indonesian version of SGRQ is well correlated with 6 MWD, the Indonesian version of SGRQ can represent the 6 MWD result, especially for functional capacity assessment. Although 6 MWD is a simple test, in some conditions it is impossible

to be done. The Indonesian version of SGRQ can be repeated many times and can be used as an evaluation instrument. So, the Indonesian version of SGRQ can be recommended as the HRQL instrument for COPD.

In 2012, SGRQ was already translated into 77 languages.[9] This proves that the translated SGRQ in many languages is very important for the users. Indonesia consists of many races and ethnics as seen in table 1. The subjects also have various educational backgrounds and professions. But, the Indonesian version of SGRQ in this study has been proved understandable for all the subjects. The limitation of this study is all the subjects filled the SGRQ guided by the researcher. We suggest for future study, all the subjects can fill the SGRQ independently.

CONCLUSION

The Indonesian version of SGRQ is well validated with the 6 MWD as the functional capacity test for COPD patients. The reliability test also showed that the Indonesian version of SGRQ is a reliable test based on the test-retest reliability and internal consistency results.

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