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Clinical Factor Affecting Quality of Life Among Chronic Obstructive Pulmonary Disease Patients

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Abstract

COPD is a chronic respiratory disease with the main complaints are breathlessness and decreasing tolerance for activities leading to the worsening quality of life. The study this study contributed to discover the clinical factors on the quality of life of COPD patients. This is a quantitative correlation study conducted at the Pulmonary Specialist Polyclinic, Panti Rapih Hospital and Panti Rini Hospital, Yogyakarta, Indonesia. Sampling was carried out with a total of 75 COPD patients who visited the pulmonary specialist polyclinic. Data collection through filling out questionnaires directly to respondents in a cross-sectional manner. Quality of life was measured using the SGRQ instrument and the method of assessment was using the SGRQ manual calculator. The data is processed by Spearman's test to see the relationship between variables. The results of the SGRQ showed that 54.7% of respondents had moderate quality of life. There was no relationship between quality of life and length of illness, the presence of other diseases, and BMI, and there was a significant relationship between quality of life and the degree of COPD. This study found that 53.3% of respondents were in the age range of 60 – 74 years, 66.7% were male, 57.3% were ex-smokers, 40% had COPD for less than one year, 89.3% had no history of other lung diseases, 45.3% were at BMI was normal and 44% underweight, and 54.7% were in the COPD GOLD 2 severity. So we can conclude that from a clinical perspective, only the degree of COPD is significantly related to quality of life.

***Keywords** : COPD; Quality of Life; Clinical; SGRQ*

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1. Introduction:

Chronic Obstructive Pulmonary Disease (COPD) is one of the non-communicable diseases in the world. COPD was firstly identified in the early 1960s. It tends to increase its morbidity nowadays (Djojodibroto, 2014). The prevalence of COPD patients is 6.6% of the total world population (American Lung Association, 2018). It is the third highest cause of death in the world (World Health Organization, 2022). WHO also predicts that COPD morbidity will increase from the 12th to 5th most common disease in the world, including in Asia.

The prevalence of COPD in Asia is approximately 6.3% is shown by Tan (2013) who studied the prevalence of COPD in 12 countries in Asia-Pacific. The results explained that Hong Kong and Singapore are the countries with the lowest prevalence of COPD (3.5%), and Vietnam has the highest prevalence of COPD at 6.7% (Tan, 2013). Meanwhile, Indonesia has a prevalence of COPD around 1.3% (Riskesdas, 2018). Yogyakarta is a city in Indonesia that has a high estimated life expectancy of 74 years compared to the national scale (66.2 years). Therefore, the prevalence of COPD also tends to increase. The prevalence of COPD in Indonesia approximately 3.7 percent in people over 30 years old, while in Yogyakarta it reaches 3.1% based on the symptoms (Riskesdas, 2013).

Panti Rapih and Panti Rini Hospitals are hospitals belonging to the Yogyakarta Panti Rapih Foundation that experienced an increasing prevalence of COPD. In the last three years, there are 1.074 patients COPD with 50 new patients that treated at Panti Rapih Hospital. The results of interviews with nurses and rehabilitation officers at the hospital show that the rehabilitation program aims to post-exacerbation COPD patients by removing phlegm and irradiating. There is no rehabilitation program such as endurance training and breathing exercises in stable COPD patients to reduce activity intolerance and shortness of breath

The shortness of breath suffered by COPD patients is progressive, persistent, and getting worse along with their activities (WHO, 2022). It is caused by decreasing forced expiratory volume in one second (Force Expiratory Volume/FEV_1) and decreasing or normal forced vital capacity (Force Vital Capacity/FVC). These cause the decreasing ratio of FEV_1: FVC. The shortness of breath is experienced by the patients since the early stages of the disease. This complaint will appear if there are precipitating factors, and it will get worse with increasing physical activities (Kendall, 2014).

The progressive and irreversible shortness of breath will affect the quality of life of COPD patients. This finding is supported by Monteagudo (2013) in France from 2009 to 2010 on 400 COPD patients over 40 years old. The results indicate that COPD affects and decline the quality of life in 50.6% of respondents with a p-value lower than 0.02. This is also proven by Horner (2020), who studied 850 COPD patients. The results showed that 50.3% of respondents could not do any sports and 78.7% felt that their respiratory system interfered with their activities which badly affected their quality of life.

The quality of life is also influenced by COPD and other factors. Siebeling et.al (2014) studied and predicted the quality of life in 409 COPD patients in Switzerland and the Netherlands. He showed that the main predictor of decreased quality of life was shortness of breath (with a regression coefficient of 0.66), fatigue (with a regression coefficient of 0.63), emotional disturbance (with a regression coefficient of 0.56), and self-control (with a regression coefficient of 0.43). The American Lung Association (2018) surveyed 1,334 COPD sufferers in America and explained some factors that worsened the quality of life in COPD patients, including physical limitations (70%), decreased ability to work (51%), limitations in meeting daily needs (56%), decreased social activity (53%), and insomnia (50%). Decreased activity tolerance will reduce the patient's level of independence.

Based on some descriptions above, the researcher contributed to identify the relationship between clinical factors and the quality of life of COPD patients at Panti Rapih and Panti Rini Hospitals in Yogyakarta. There are another factors related tp quality of life among COPD patients : age, gender, smoking status, long suffering COPD, History of Other Diseases, BMI, and COPD Stage.. Age influences the increase in COPD prevalence due to changes in lung structure, thoracic shape and respiratory muscle weakness, a decrease in the number of functional alveoli and a decrease in lung elastic recoil which causes a decrease in lung elasticity. Based on gender, COPD increases in men due to a history of smoking, but according to GOLD women are more suspect (susceptible) to the effects of smoking compared to men. In cigarettes, several irritants have been found that can stimulate excessive mucus production, cause damage to cilia function, cause inflammation and irritation of the bronchiolar and alveolar walls (Black, 2009). Nutritional status also affects muscle dysfunction, decrease in muscle mass and muscle fiber strength which may cause a decrease in contractility, strength and resistance of respiratory muscles. Patients who suffer from COPD for a long time are also at risk of airway obstruction and damage to lung recoil. The longer you suffer from COPD, it is thought that the degree of COPD will be more severe and the more complaints you will experience, thus having an impact on the survival rate of COPD sufferers.

2. Method

This research uses a quantitative design with a correlative method to view the relationship between clinical conditions and the quality of life of COPD patients. The primary data are taken from questionnaires and interviews. The patient's quality of life is measured by the SGRQ instrument consisting of 50 question items divided into three components including symptom, activity and impact domains . The assessment is conducted using SGRQ manual calculator in Microsoft Excel format and has obtained permission from St. George's University of London. The data are processed univariately to perform the distribution of respondents' characteristics. The process is also done bivariate using chi-square to examine the relationship between clinical conditions and patients' quality of life in terms of signs, symptoms, activities, and impacts.

SGRQ is a standardized questionnaire used in patients with respiratory disorders and is recommended for measuring the quality of life of COPD patients. The SGRQ consists of three subscales, namely symptoms (16 items), activities (16 items), impact (26 items), and one overall score. SGRQ has been internationally standardized with good validity values. The three components and the total component of the SGRQ each have Cronbach's α-0.77, 0.91, 0.86, and 0.94), and have good intercorrelation ($r > 0.41$) and good correlation with the total score ($r > 0.63$) (Al-Shair, 2013). SGRQ intraclass correlations range from 0.795 to 0.900 (American Lung Asspciation, 2018). The validity test was carried out on 41 respondents. The Indonesian version of the SGRQ questionnairethe translated by tho experts. This instrument meets the validity and reliability criteria with Cronbach alpha values reaching > 0.7 for symptom, activity and impact domains. The scoring technique was carried out based on the SGRQ manual guidelines and the quality of life

classification was based on guidelines from St Paul University

The research population is all COPD patients who are treated at the Panti Rapih Hospital Yogyakarta polyclinic and Panti Rini Hospital, Yogyakarta, Indonesia. The sampling is carried out on a side-by-side basis (75 COPD patients who visited the pulmonary polyclinic of Panti Rapih Hospital and Panti Rini Hospital Yogyakarta). The research was conducted for four months from March to June 2015.

The data are collected using questionnaires containing demographic data and instruments taken from SGRQ. The data are collected in a cross-sectional way, where the respondents commonly spend 20 minutes filling out the questionnaires independently. The research permit is obtained from the STIK Sint Carolus Educational Institution and the education and research division of Panti Rapih Hospital and Panti Rini Hospital. Then, the researcher submits a permit to the Directors and the Head of Research and Development Divisions assigned to the ethics committee. After the proposal is approved by the hospital ethics committee, a permit is issued to the head of the outpatient ward at Panti Rapih and Panti Rini Hospitals. Next, the researcher collaborates with the head of the rooms and research assistants for the data collection.

Statistical tests use univariate and bivariate tests. Univariate tests were carried out to see the demographic data of respondents. The bivariate test uses Spearman's rho to see the closeness of the correlation between variables on an ordinal scale or one variable on an ordinal scale and the other nominal or ratio

3. Results and Discussion

Table 1 shows that more than half (53.3%) of the respondents are 60-74 years old. None of them are below 45. It means that most COPD sufferers are elderly (85.3%).

Table 1. Baseline Characteristic of The Respondents Based on Ages (N=75)

Ages (y)	n	%
<45	0	0
45-59	11	14.7
60-74	40	53.3
>74	24	32.0
Total	**75**	**100**

The results are similar to the AIHW (2020) that the prevalence of COPD is estimated at 7.5% in individuals aged 40 years and 30% at the age of 75 years. This founding according to Ntritsos et al. (2018) that age ≥40 contributed most significantly of prevalence estimates across studies. The frequency of COPD tends to increase with age with a peak frequency at 60-70 years old. The increasing prevalence of COPD in the elderly is led by changes in lung structure, thorax shape, and weak respiratory muscle which causes decreasing lung elasticity.

Table 2 shows that more than half (66.7%) of the respondents are male. It means that men have a greater tendency to suffer from COPD. The results are like Islam et al. (2013) that studied 900 COPD patients in Dhaka, Bangladesh. He showed that the ratio of male and female COPD patients is 4:1. The difference in the prevalence of COPD by gender is in line with the American Lung Association (2018) that there are more male COPD patients than women. It may be because men like to smoke more than women. This trend has begun to change in the last decade, where the prevalence of COPD in women is almost equal to that of men due to the increasing number of female smokers. This researcher's analysis is by the AIHW (2020) that the ratio of female and male COPD sufferers is nearly the same. It is assumed that women will be more dominant in the future. This finding also supports GOLD that the prevalence of COPD by gender is associated with a history of smoking in women. They are more suspect (vulnerable) to the smoking effects than men.

Table 2. Baseline Characteristic of The Respondents Based on Gender (N=75)

Gender	n	%
Male	50	66.7
Female	25	33.3
Total	**75**	**100**

Table 3 shows that more than half (57.3%) of the respondents are former smokers. Smoking is the leading cause of COPD. The prevalence of COPD in smokers is strongly influenced by the way of smoking, the dose of cigarettes, and smoking duration. Smokers with pipes and cigars have lower morbidity and mortality than cigarette smokers. This results is accordance with Haque et al. (2022) that tobacco consumption was significantly associated with COPD.

Table 3. Baseline Characteristic of The Respondents Based on Smoking Status (N=75)

Karakteristik	n	%
Not a smoker	12	16.0
Ex-smoker	43	57.3
Passive smoker	18	24.0
Active Smoker	2	2.7
Total	**75**	**100**

COPD patients should stop smoking to maintain lung functions and improve their quality of life. Monteagudo (2013) examined some factors that can improve the quality of life in 791 COPD patients. The results showed that the factors include

smoking cessation, regular drug consumption, regular control, nutritional balance, and pulmonary rehabilitation (Monteagudo, 2013). This finding is the same as Tomioka (2014). He studied the effects of smoking cessation on quality of life. He conducted research by running a smoking cessation program on 570 COPD patients in Japan. His findings showed an increase in the quality of life in the group who quit smoking compared to the control group with a p-value lower than 0.0001.

The results for long-suffering from COPD in table 4 show that most respondents (30 people/40%) have suffered from COPD for less than one year, and 29 patients (38.7%) have suffered from 1 to 5 years. The high number of new COPD sufferers (less than one year) might be related to the perception of health and illness. People view illness as an inability to carry out activities of daily living. It influences the tendency to use health services at the advanced COPD level. The sufferers will seek health services after they feel their complaints are getting worse or are at an advanced COPD level. This analysis is the same as Fastenau et al. (2014) that COPD patients begin to experience decreasing activity tolerance, impaired respiratory function, muscle weakness of the extremities, and worsening quality of life after admission at a moderate level.

Table 4. Baseline Characteristic of The Respondents Based on Long-Suffering COPD (N=75)

Long-suffering (y)	n	%
0-1	30	40.0
1-5	29	38.7
5-10	16	21.3
Total	**75**	**100**

The duration of suffering from COPD will affect the patient's survival rates. If they have experienced COPD for a longer period, they will also suffer from more severe COPD levels and complaints. Both influence the survival rates of COPD sufferers. This analysis is the same as a study that only 21.3% of respondents have suffered from COPD for more than five years. This is presumably due to the low survival rate resulting in an increased mortality rate in COPD patients. It is proven by Titlestad (2013) that studies 253 COPD patients at Odense University Hospital. His result showed that the survival rate of COPD patients would decrease by 23.7% after five years of suffering from COPD.

Table 5 shows that almost all of the respondents (89.3%)) have no history of other lung diseases. The results do not support Lee et al. (2015) who examined 24,871 COPD patients aged over 40 years in Korea. He found the prevalence of COPD was related to the level of respiratory tract infection (OR: 4.5; 95% CI: 2.3–8.7). It means individuals with recurrent lung disease will suffer from COPD 4.5 times greater than those without any disease.

Table 5. Baseline Characteristic of The Respondents Based on History of Other Diseases (N=75)

Karakteristik	n	%
Exist	8	10.7
Not exist	67	89.3
Total	**75**	**100**

Repeated respiratory tract infections will cause lung damage and decrease lung functions. In the end, there will be a risk of airway obstruction and damage to lung recoil. This analysis is in line with Black (2019) that recurrent lower respiratory tract infections in childhood are associated with decreased lung functions and increased respiratory symptoms in adulthood. Recurrent respiratory tract infections will also trigger acute exacerbations of COPD at the next stage. GOLD (2020) also added that recurrent respiratory tract infections are influenced by an inflammatory process that worsens the exacerbation period, decreases lung functions, and increases symptoms of respiratory distress.

Table 6 shows that most respondents have normal BMI (45.3%) and are underweight (44.0%). Based on the BMI data, there are 33 respondents (44%) who have BMI underweight (<18.5 kg/m2). It shows the inadequate fulfillment of nutrition in COPD patients that is used to meet the body's needs. Underweight BMI is one of the risk factors for COPD. Grigsby (2019) explained that low BMI is strongly affected by COPD and decreased lung functions. This finding is similar to a study by Lee et al. (2015) on 24,871 COPD patients aged over 40 in Korea. The results indicate that 64.7% of respondents have an underweight BMI. Thus, underweight BMI is a factor that triggers COPD (Odd Ratio: 3.1; 95% CI: 1.0–9.4). Nguyen et al.?? (2019) studied abput nutritional status, dietary intake, and health-related quality of life in outpatients with COPD. The result says that malnutrition was significantly associated with disease severity (*P*=0.039) and ratio of protein intake to estimated requirement (*P*=0.005).

Table 6. Baseline Characteristic of The Respondents Based on BMI Diseases (N=75)

Karakteristik	n	%
Underweight	33	44.0
Normal	34	45.3
Overweight	8	10.7
Total	**75**	**100**

Malnutrition affects muscle dysfunction. It causes a decrease in muscle mass and fiber strength

and leads to low contractility, weakness, and respiratory muscle resistance. Decreased strength and endurance in the respiratory muscles will trigger COPD. This analysis is supported by Keogh et al. (2021). He found that malnutrition is associated with an increase in the concentration of *necrosis factor-α* and the release of proinflammatory mediators through the secretion of cytokines. It causes amino acid mobilization, stimulation of protein catabolism, and increased resting energy expenditure. It results in decreased muscle strength and oxygen saturation.

The body performs physiological compensation for decreasing oxygen saturation by increasing the work of the respiratory muscles. The continuous workload in the respiratory muscles will decrease their strength and endurance, resulting in a flattened diaphragm. The flattened diaphragm causes abdominal compression and distension, which compresses the lungs and reduces the lungs' functional capacity. Keogh et al. (2022) also stated that malnutrition causes muscle dysfunction and changes in lung morphology due to electrolyte imbalance, muscle atrophy, and changes in the geometry of the thoracic skeleton. Muscle dysfunction occurs due to decreasing glycolytic and oxidative capacity type I and II of muscle fibers. All of them cause muscle weakness. Lung morphological changes include widening of the lung spaces, destruction of septa, and thinning of the interalveolar walls leading to lung collapse.

Besides being a risk factor for COPD, malnutrition can also negatively affect the recovery of COPD patients. This statement is under Wada et al. (2021) study on 45,837 COPD participants. This study showed that increment of BMI could be markers for COPD prognosis, indicated by risk of COPD mortality. The results indicate that the group with lean BMI has a higher risk of carbon dioxide gas retention due to decreasing serum albumin levels. The retention will aggravate the work of the lungs and trigger exacerbations.

Table 7. Baseline Characteristic of The Respondents Based on COPD Stages (N=75)

Stage	n	%
GOLD 1	10	13.3
GOLD 2	41	54.7
GOLD 3	24	32.0
Total	**75**	**100**

Table 8 shows that more than half (54.7%) of dents have a moderate quality of life. Most of them have moderate quality (48%) in the aspect of signs and symptoms, low (54.7%) in carrying out daily activities, and fair (46.7%) on the impact of the disease. The results indicate a decrease in COPD patients' life quality. The results are also under Fastenau (2014) that COPD patients experience some complaints such as decreased activity tolerance, impaired respiratory function, extremity muscle weakness, and quality of life after admission to moderate COPD (FEV_1 30%-50%).

Table 8. Baseline Characteristic of The Respondents Based on Quality of Life (N=75)

	Symptoms		Activity		Impact		QoL	
	n	%	n	%	n	%	n	%
High	6	8.0	11	14.7	22	29.3	10	13.3
Moderate	36	48.0	23	30.7	35	46.7	41	54.7
Low	33	44.0	41	54.7	18	24.0	24	32.0
Total	**75**	**100**	**75**	**100**	**75**	**100**	**75**	**100**

Table 9 shows no relationship between quality of life and length of illness, the presence of other diseases, and BMI. There is a significant relationship between quality of life and the degree of COPD. COPD negatively influences the patient's quality of life. It is even getting worse with the increasing COPD level. Based on the results of the European Respiratory Society's Annual Congress (2013), 54% of patients rely on help from others in carrying out their daily activities, 52% of COPD patients feel a loss of hope, 41% are unable to plan for the future, 37% have decreased their income, and 34 % stated that there is a disturbance in their social relations. Decreased physical functions in COPD patients also cause a decreasing quality of life related to productivity. This finding is similar to DiBonaventura (2012). He examined 297 COPD patients in the United States. The results showed that COPD patients with more severe levels experienced decreases in their health status ($p<0.05$), workability ($p<0.05$), an increase in the number of absenteeism from work ($p<0.05$), and an increase in work disorders ($p<0.05$).

Table 9. Significancy Test Result

No	Sub Variable	Sign
1	Long-suffering COPD	0.546
2	History of Other Diseases	0.119
3	BMI	0.224
4	COPD Stage	0.000

The relationship between the level of COPD and quality of life is similar to the Global Initiative for Chronic Obstructive Lung Disease (2020) that COPD sufferers with more severe respiratory symptoms are closely related to worse quality of life, lung functions, lower exercise capacity, and higher risk of death. Monteagudo (2013) studied factors that can improve the quality of life in 791 COPD patients. They are smoking cessation, regular drug consumption, control, nutritional balance, and pulmonary rehabilitation (Monteagudo, 2013).

4. Conclusion

The 53.3% of respondents were in the age range of 60 – 74 years, 66.7% were male, 57.3% were ex-smokers, 40% had COPD for less than one year, 89.3% had no history of other lung diseases, 45.3% were at BMI was normal and 44% underweight, and 54.7% were in the COPD GOLD 2 saverity. The results of the SGRQ showed that 54.7% of respondents had moderate quality of life, with the majority being in moderate quality (48%) in the symptomatic aspect, low (54.7%) in the symptomatic aspect. ability to carry out activities, and moderate (46.7%) on the aspect of the impact of the disease. Based on the Spearman test, it was found that there was no relationship between quality of life and length of illness, the presence of other diseases, and BMI, and there was a significant relationship between quality of life and the degree of COPD. So we can conclude that from a clinical perspective, only the degree of COPD is significantly related to quality of life.

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